

PLASTICS

& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5

MARCH, 1929

No. 3

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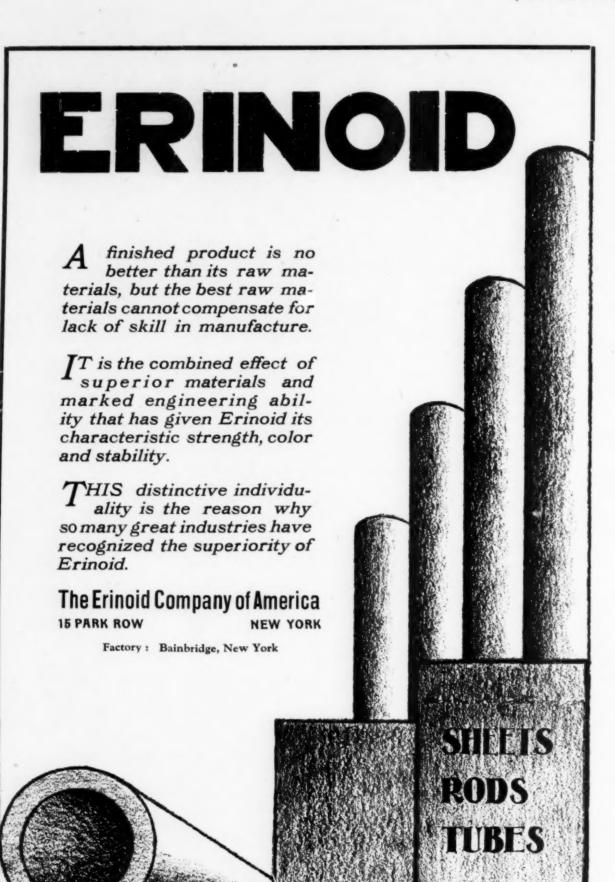
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East: R. C. Gilmore, Jr., Nicholas Klein, Ch. E., 114 East 32 Street, New York City West: H. D. Payne, 534 Belmont Avenue, Chicago, Ill. England: H. A. Lawrence, 80 Fleet Street, London, E. C. Continental Europe: The A. D. S. Service, Berlin, Germany

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Synthetic Resins Combined With Paper During Its Manufacture

Ordinary beating-engine employed to incorporate the dispersed resin with the paper stock, after which it is sheeted and suitable for building up laminated products

A LBERT L. CLAPP, of Danvers, Mass., proposes according to his U. S. P. 1,684,755, Sept. 18, 1928 to produce a fibrous production like fibre board containing a synthetic resin.

The object of the invention is to produce, by the use of paper-making machinery, a fiberboard or paper containing a maximum quantity of synthetic resins or gums,—especially fusible forms of phenol resins rendered set or infusible, as hereinafter described, under the action of heat and pressure,—and possessing marked insulating and waterproof properties.

Difficulties

Hitherto the attempts to incorporate synthetic resins in a fibrous stock have been unsuccessful commercially, for the reason (among others) that, when the dried sheets were subjected to heat and pressure, the discrete particles of resin would not flux readily or sufficiently to penetrate throughout the entire sheet.

If there be employed with such synthetic (e. g. phenol) resins, a relatively-low-meltingpoint fluxing agent such as a natural resin, of which rosin is an example, or a wax, of which Montan wax is a representative, The advantages of having a fibrous filler has led many inventors to attempt to produce a practical mixture by incorporating the resins with the fiber while the latter was suspended in water, as it is prior to entering the paper-making machine.

The present process dates back to 1922 when the patent was applied for.

—it is possible, when the sheet in which these bodies are incorporated is subjected to heat and pressure, to cause the discrete particles to flux and blend and penetrate the pores and interstices of the fibrous sheet, all without materially affecting the physical or electrical properties of the synthetic resin or the cellulose fiber.

Wood flour, has the property of carrying into an aqueous fiberous pulp relatively large quantities of pulverized gums or resins, either natural or synthetic, and that this is augmented by the production in the pulp of a coagulum which functions to fix the pulverized gums or resins on the fibers.

By incorporating in aqueous paper stock powdered phenol or other synthetic resin and a fluxing agent for the resin (such as rosin or Montan wax), then sheeting the pulp, and after drying the sheet subjecting it to sufficient heat and pressure to set or render the resin infusible for a brief period,—there is produced a sheet loaded with synthetic resin in a coalescent practically-continuous state, posessing a high coefficient of electrical resistance, and having those other properties incident to the synthetic resin employed.

In selecting the fluxing agent, care must be exercised to use only those which are solid at ordinary temperatures and are capable of being powdered, and which have a relatively low coefficient of viscosity when molten, so that they will be capable of blending with the phenol-resin at its setting temperature and penetrating the pores and interstices and the fibers of the fibrous fundation in which they are incorporated.

Beating In the Resin

The following examples will serve to illustrate the new process for producing a fiberboard or paper embodying the invention.

An ordinary beating engine (such as employed for producing paper pulp to be sheeted by a paper-making machine) is charged with say 10 to 20 parts

by weight of any suitable cellulose fibers, preferably sulphate pulp because of its strength when sheeted, and just sufficient water to ensure the proper circulation of the stock. This stock is now beaten, until it is more or less hydrated, say for a period of about one and a half hours. There is now thoroughly beaten into and distributed throughout the stock 50 to 90 parts of finely divided fusible phenol resin or other equivalent synthetic resin. Then there is added 10 to 15 parts of the fluxing agent in finely powered form,-either rosin or Montan wax or their equivalent.

Preferably, in the preparation of the pulp, either before or after the addition of the synthetic resin, there is also incorporated a certain quantity of wood flour, say, 15 to 30 parts; and, if a coagulum is to be produced in the pulp, the pulp has beaten into it before the synthetic resin is added, 10 parts of sodium silicate in an aqueous solution, $40^{\circ}-60^{\circ}$ Bé.; and, as a final step in the process, the pulp is mixed with about 20 parts of alum or equivalent coagulant.

Laminating

The stock is then sheeted by any suitable form of paper-making machine, such for example as a wet or a multiple-cylinder machine. Perferably the sheets are air dried, or, if not, a sufficiently low drying temperature should be employed as will not affect the phenol resin. Finally the dry sheets are subjected to the application of heat and great pressure for a brief period to cause the setting of the resin to an infusible condition. For example, they are subjected to a pressure of about 1,000 pounds per square inch, more or less, and to a temperature of, say, 300° F. for about 15 seconds. When so treated, the resultant product is a hard dense sheet having the resinous material thoroughly incorporated therein and coalesced and set or rendered infusible throughout the sheet, so that the fibers are encased and more or less penetrated by the infusible resinous material.

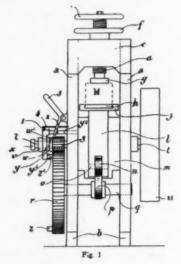
Two sheets, when initially dried, placed in facial contact, and subjected to heat and pressure, as hereinbefore described, become cemented together and form a substantially integral and homogenous sheet.

It will be observed that the amount by weight of resin in the sheet greatly exceeds that of the fibers,—being in fact several times that of the fibers and at least five times that of the fluxing agent. When wood flour is used as a carrier, the ratio thereof to the phenol resin and the fluxing agent may be 1 to 4 or approximately 1 to 5.

New French Cam Press Described

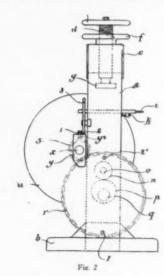
By securing the proper dwell on the pressure stroke perfect molding is secured

In the November issue of our valued French contemporary magazine, the Revue generale des Matieres Plastiques (p. 664) there is described a rather novel form of molding press employing the cam principle instead of hydraulic plungers. The press makes use of the force developed by a suitably shaped cam, the action of which is transmitted to the press-platen by means of gears.



One of the advantages of the press is that it obviates the necessity of using hydraulic equipment, and also, as the entire driving mechanism is at the lower end of the press, makes the same safe to handle and operate. Two elevations of the press, one showing a side view and another a front view, will serve to illustrate the construction and principles of operation.

The press is the invention of the French engineer, Mr. Claudius Thomasset. As shown in the figures, the press consists



of two upright supports a built upon a suitable base b, which are united at the top by a transverse member c through which passes' a control-screw d which is actuated by a handwheel e. A second opposed handwheel f serves to lock the screw in any desired position. As the rise of the platen is constant, the pressure applied by the platen is thus controlled by the relative position of the screw d which supports one half of the molds used. The mold support is attached to the screw d whilst the other part h of the mold is fastened to the platen j, being preferably partly countersunk in the platen to prevent longitudinal and lateral

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displacements during the molding operation.

The platen is supported by a cylindrical piston-like part I, and is vertically movable in guides m. At the lower end of this piston there is a roller n mounted upon a shaft o. This roller is in constant contact with a cam p that is keyed to a shaft q, which latter also has keyed to it a large gear r that is in mesh with a smaller pinion s that is fastened to a shaft t. This shaft also supports the driving-pulley u. the other end of the shaft being supported by the bearing x. The clutch mechanism by means of which the drive-shaft is coupled with the gear is shown at the left of figure 1, and comprises the clutch w. The construction of the clutch is given, but its construction is standard and quite obvious from the figures.

How It Works

The action of the press is easily followed, being essentially like this: The driving-pulley by actuating the shaft t (when coupled thereto by the clutch) causes a rotation of the shaft carrying the cam p, thus producing an up and down movement of the piston that supports the platen and the mold. As however in all molding operations it is essential that the mold remain closed while under pressure for a long enough time to secure the curing of the plastic material, provisions are made to disengage the clutch at the exact instant when the cam p has lifted the platen and mold to its uppermost, high-pressure position. Then, although the gear continues to revolve, the press does not move. A pull on the lever 3 however again throws in the clutch and the piston and platen descends, stopping by disengagement of the clutch at the wide-open position, so that the molded part may be removed and the mold recharged with fresh material.

The essential features are the means employed for stopping the movement of the platen at its upper stroke and at the bottom stroke. The inventor states

Another Source of Plastics— Glutin

Alkali compounds of a product derived from bones forms basis of moldable compound

Among the nitrogenous proteid materials suggested for the production of plastics, casein, gelatin and keratin have been the most often mentioned. The manufacture of casein solids has reached important proportions. The material now suggested is glutin (not to be confused with gluten of vegetable origin),

which is a hydrolytic conversion product of the ossein in bones, and is somewhat similar to gelatin. The cost is said to be fairly low. The material finds its application mainly in the form of its metal salts, the preparation of which is the subject of the patent discussed.

POR use as a casein substitute and for the manufacture of molded articles Karl Küttel, of Vienna, proposes the metal compounds of glutin. He describes these in a patent recently issued (U. S. P. 1,686,281; Oct. 2, 1928).

It has been known that the mechanical properties of glutin may be improved by adding salts and hydroxids of bivalent or trivalent metals.

The metal-hydroxides, in a pulverized condition, are mixed with the glutin or glutinous material and subsequently are compressed under the application of heat; or the metal-hydroxids are mixed with an aqueous glutin-solution; or the metal-hydroxids are formed in the aqueous glutin-solution by a double conversion of a metal-salt and an alkali-or alkali-carbonate solution.

However all these masses are only various mixtures of metalglutin and free metal-hydroxid.

Küttel has discovered that under certain conditions all the glutin can be separated as pure metal glutin, and only this material possesses the mechanical properties required of a material to be employed for manufacturing purposes. A pure

metal glutin will advantageously serve as a casein substitute and is also adapted for the manufacture of many of the marketed articles now composed of Bakelite. The particular merit of pure metal glutin is that it can be more quickly and more economically produced and fabricated.

In order to separate all the glutin to obtain a pure metal-glutin it is necessary:—

- 1. To alkalize at first the glutin-solution and thereafter separate by the aid of metal-salt.
- 2. To add to the glutin only such a quantity of alkali, that the entire glutin is transformed into saturated alkali-metal-glutin. This alkalinity is positively determined by the chemical character of the glutin and can be determined in various ways, such as potentiometrically or viscosimetrically.
- 3. To obtain the best alkalinity which is only to be realized if one observes and retains its exact proportion whereby the total glutin is precipitated, without any remaining in the solution.
 - 4. To add an excess of the

(Continued on page 152)

that certain modifications may also be made, such as the use of further reducing gears if higher pressures are to be employed. Instead of a hand-lever to throw the clutch in and out this might equally well be accomplished by a foot pedal. Automatic lubrication of all moving parts is provided for.

Pyroxylin as an Imitative Material

A complete review of the United States Patents relating to the use of pyroxylin plastics to imitate natural products such as ivory, horn, tortoise shell, onyx, mother-of-pearl and other ornamental materials

By Joseph Rossman

The Manufacture of Artificial Ivory Rings and Tubes

In the manufacture of tubes the plastic material has sometimes been forced out of a stuffer in a tubular form, or the rings or tubes have been punched or cut out of a solid sheet or block. When forced from an ejector it is difficult to preserve the individuality of the layers in the rings, and when cut or punched from solid sheets there is a great waste of material. Besides, the prior methods involve expense and delay incident to seasoning the material. These difficulties are obviated by the process of patent 329,273 dated October 27, 1885, in which a piece of sheet celluloid is cut into strips of a suitable size for making tubes of the required The longitudinal dimensions. edges* of each strip A are beveled on alternate sides, as shown at a a, Figs. 1 and 2, so that then brought together they will overlap, producing a tube of uniform thickness. The strip A, before bending, is softened by heat, and is then rolled around the mandrel B into the desired round, or tubular form, and with the beveled edges a a in contact. The mandrel B, with the tubular strip, is then placed in the lower part of a sectional mold or die, C, as shown in Figs. 3 and 4. In placing the mandrel and tube within the die, the seam is placed uppermost and a solvent, such as spirits of camphor or wood alcohol is applied to the edges of the seam. A strip, b, of paper is applied over the seam to prevent the solvent from spreading

The present review began on p. 69 of the February issue of PLASTICS. Being compiled from the patents themselves, and not from other reviews, it is accurate and authoritative, setting forth what a host of inventors have contributed to this complex art.

Pyroxylin plastics were the pioneers and pathfinders in the domain of the modern plastics.

too rapidly, and also presents an obstacle to the entrance of dirt or dust. The upper half, c, of the die is now brought down onto the tube and its inclosed mandrel and suitable pressure exerted upon the inclosed die. After remaining in the die until it is set the tube and its mandrel are withdrawn and the tube detached from the mandrel. The tube is now ready for finishing by polishing or in any desirable manner and can be used for handles for canes, umbrellas, parasols, whisks, brushes, and many other articles. Cut into short sections, as shown in Fig. 6, they serve as martingale rings, napkin-rings, slide-rings for parasols and umbrellas. teething-rings for infants, and various other purposes.

Making Billiard Balls

The method of making artificial ivory billiard balls from pyroxylin is described by John Jarvis in his patent 342,208 as follows: Take zylonite or other pyroxylin compound having mingled with it the pigments necessary to impart the white body

color and the yellowish surface tint peculiar to ivory, oxid of zinc and chrome yellow being adapted to this purpose. Bonedust is also added to the compound, in the usual manner, to impart the necessary gravity, the usual and well known method being to mingle the zylonite or other pyroxylin compound, the bonedust, and the proper pigments thoroughly together and adding spirits of camphor and placing it in an airtight receptacle, where it is allowed to remain for twenty-four hours or more. It is then subjected to the action of mixing or converting rolls, which are acted upon alternately by heating and cooling agents, and by these rolls the substance is converted into a homogeneous mass. It is then put in a drying-house and allowed to season, during which time the greater part of the alcohol passes off with part of the camphor. After seasoning for a suitable period, from thirty to sixty days, it is taken out and pulverized, a part being reduced to fine dust or impapable powder, and some to the condition of coarse particles, flat or cubical in shape, and about one-sixteenth of an inch in diameter.

Camphorizing

A solvent of camphor is then obtained which is not a solvent of pyroxylin, such as coal-tar, naphtha, or any hydrocarbon, taking one part, by weight, of camphor to one hundred parts, by weight of manufactured material, and having dissolved the camphor in this solvent, the pulverized and comminuted com-

pound described is mingled with the solution. The camphor being in solution and the latter being thoroughly mingled with the fine dust and the coarser particles of the pyroxylin compound, the solution surrounds each particle and completely envelopes it with a liquid holding camphor in solution, whereby, upon the naphtha or other hydrocarbon solvent being driven off by heat or otherwise, a thin film of camphor-gum is left perfectly distributed throughout the mass and enveloping each minute particle thereof. When the hydrocarbon solvent has been eliminated, the mass is subjected to the action of hot vapor of alcohol, and to a high heat

and great pressure, whereby it is brought into the proper shape and condition to be turned in a lathe and stained upon the surface, and finally polished by buffing, like other balls, whether of ivory or composition.

Etching With Acid

The process of patent 360,811, April 5, 1887 consists broadly, in the treatment of the surface of celluloid when it contains a coloring matter, such as oxid of zinc, with an acid having the property of dissolving or otherwise changing the coloring matter. This acid is preferably nitric acid or sulfuric acid, or a combination of both, sufficiently diluted. When applied to cellul-

oid having oxid of zinc as a coloring matter, the acid will dissolve and abstract the oxid of zinc at the point where it is applied, leaving a tint corresponding very nearly with the color of the pyroxylin composition, free from pigment. This tint closely resembles that of the grain lines of ivory. By using proper care the acid may be applied in a minute line to the celluloid, dissolving or otherwise changing a minute quantity of pigment, and yet leave a distinct and well defined line upon the surface. Of course the greater the quantity of pigment extracted the more pronounced will be the tint.

Wax Resist

In order to assure the application of the acid in the proper design, and to prevent, by accident or otherwise, the discoloration of other parts of the surface, the patent discloses a method of treating the article. which consists in coating the surface with wax or other material having the property of resisting the action of the acid a less degree bees-wax and employed. Paraffine-wax and in others are capable of use when nitric or sulfuric acid is employed. After coating the surface of the celluloid with the wax, preferably in a melted state, and after it has cooled the design is cut in with an ordinary engraving tool. In this proceeding the instrument should pass entirely through the wax coating; but it is preferable that it shall not cut into the celluloid. The acid is then applied to the entire surface, and will attack the exposed parts of the celluloid without discoloring the parts covered by the wax coating. The wax is provided merely for the purpose of protecting the surface of the celluloid, and may be applied in many ways besides the one above described, and may consist of other material than wax, the essential requirement being that it shall resist the action of the acid.

It may be found desirable, where another design besides graining is to be applied, to form

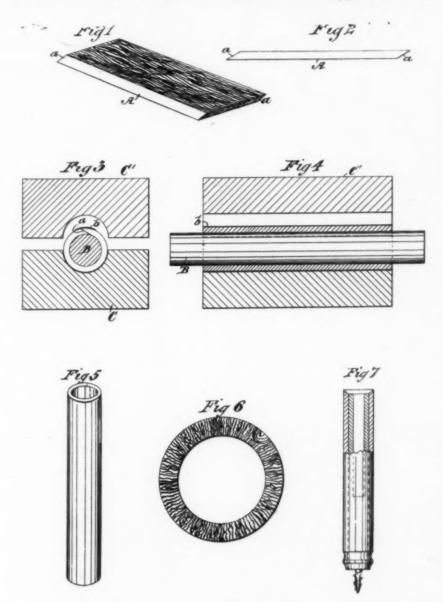


Illustration No. 1. Showing how artificial ivory rings and tubes are made from strips of pyroxylin plastic, cut and rolled about a mandrel. (See p. 132, column 1).

the design upon paper, cutting it out in the necessary outline and besmearing one surface with paraffin wax or other acid resistant and then applying it to the celluloid surface.

After the acid has remained for a sufficient length of time upon the celluloid, it is washed off with water, and then the resistant is removed by rubbing it with a light oil or otherwise. The celluloid may then be polished in the usual manner. As the acid does not affect the pyroxylin proper, but only the coloring matter, no indentation results from the process, but the surface is perfectly smooth.

It is sometimes desirable to apply a design as well as an imitation of grain to the celluloid surface, which may readily be done by first graining it according to the process, removing the resistant, and then applying a new resistant and design outline.

Using Ornamented Celluloid

As far back as 1882 it was proposed in patent 256,476 to manufacture buttons, brushbacks, boxes, frames for handmirrors, and other articles using pyroxylin. In carrying out the process a thin sheet or film of the celluloid or other compound of pyroxylin, which may be either colored in its mass, made in imitation of tortoise shell, or made transparent is placed in a die and upon it is placed the proper quantity of ground horn or hoof to form the mass of the article. The mass is submitted to heat and pressure whereby the whole will be found united in one homogeneous mass. The degree of heat employed must be sufficient to soften and render plastic the celluloid facing, so that it will coalesce with the horn or hoof under pressure.

The article thus produced will have a complete facing of celluloid, and will be in all essential respects the same as if made from that material throughout.

In some cases it is desirable that the article shall be entirely covered with the celluloid film. In that case another sheet or film must be laid on the top of

the ground horn or hoof in the die and the whole compressed.

When it is desired to display an organized design through the transparent face the facing sheet or film may have painted or printed upon its back the desired design or ornament, employing as pigments gold, silver, or colors which will stand the heat employed in consolidating the mass.

Inlaying Celluloid With Pigment Colors

According to patent 251,924, Jan. 3, 1882 raised figures of ornamental design are placed on sheets of celluloid by laying thereupon pigment colors soft-

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

ILLUSTRATION NO. 2

Figure 1 represents the face of a button which has a facing of tortoise shell celluloid, and Fig. 2 is a cross section of the button. Fig. 3 is a face view of a button having a design printed on the back of the transparant celluloid, facing before the latter is applied in the manufacture and Fig. 4 is a sectional view of a case for a hand-mirror, showing the celluloid facing material extended over the entire surface.

ened slightly by the admixture in small quantities of any of the well known oils or spirits used for that purpose. The figures may be laid on with a common brush, or they may be stenciled on; or figures may be formed in shallow molds and then be applied to the surface of pieces to be ornamented; or the entire surface may be covered. Having thus applied the colors to the materials, the latter are set

aside until the colors shall have become sufficiently dry and hard, when they will be found to lie up entirely above the surface upon which they are placed and to adhere thereto.

They are next placed between heated plates or dies, and the whole is submitted to a strong pressure. The heated plates or dies, coming in contact with the pieces, cause the latter to lose their rigidity and to soften to a certain extent, while the degree of heat which will so operate upon the materials will not act in like manner upon the dried pigment color or colors lying upon their surface, and the result is that the colors by the pressure become sunken or inlaid into the softened surface upon which they were applied and dried, and when the pieces are cooled and removed from the plates or dies the colors will be found to be perfectly inlaid, and the outlines of the figures formed by them will be nearly, if not quite, the same as they were before having been heated and pressed, showing no distortion such as would result if the colors yielded to the influence of the heat and became at all soft.

Artificial Horn

As stated in patent 460,086, "It is well known that the horn of the ox, buffalo, sheep, goat, and other animals consists of a central portion, an intermediate portion, an external portion nested and formed together. Moreover, each of these portions comprises an opaque body having irregular streaks, fine variegated lines, and mottled or irregular spots, and when the horn is cut and polished it presents a decidedly characteristic marbled, clouded, or watered appearance, having the lines of color radiating from the top or point of the horn."

"Heretofore various articles, for example, handles and ferrules for umbrellas, canes, and the like, mouth-pieces for pipes, buttons, and other articles, have been made from the horns of animals. However, these horn articles are very expensive both

(Continued on page 153)

More Recent Work on New Cellulose Compounds

by Leon Lilienfeld

Cellulose Glycollic acids, their commercial applications; new processes for making cellulose ethers; and the preparation of ethyl cellulose described

THE products now to be described fall into two distinct groups. The first of these conalkali-soluble. stitutes water-insoluble, cellulose compounds, which might broadly be designated as cellulose-glycollic acids. These are produced, according to Lilienfeld U. S. Patent 1,682,292 (Aug. 28, 1928; filed in Austria also on April 4, 1924) by acting on alkali-cellulose with a halogen derivative of a fatty acid in the presence of water or of dilute alcohol. The mathematics of the manufacture of the products is discussed in detail but is beyond the scope of our magazine, and for these features of this invention our readers should refer to the original patent.

Properties of the Products

The products exhibit the following technically valuable properties:

They are insoluble in water, but are soluble in aqueous alkalies and may be precipitated from a solution in an alkali by adding an agent capable of neutralizing the alkali, such as an acid, an acid salt or the like; the precipitation may occur whilst the solution is still alkaline, and will certainly occur as soon as it becomes neutral. If the solution in aqueous alkali be treated with alcohol, then precipitates are obtained which, after removing the free alkali by washing with dilute alcohol (for instance of 50-90 per cent strength) are insoluble in water. They therefore yield no neutral water-soluble salts of alkali metals. The alkaline solutions or pastes of the new cellulose derivatives yield, if brought into a suitable form and treated with an appropriate

In the December issue of PLASTICS (1928, 4, 678) we had begun a description of some of the recent contributions of that versatile cellulose chemist Dr. Leon Lilienfeld, and had promised some further remarks in ths connection. Lack of space prevented our keeping our promise until the present issue, where we shall take up the other patents along the line of cellulose chemistry granted to this worker during the latterhalf of the past year.

precipitating agent, such as an acid, a salt, and acid and a salt, an acid salt, an alcohol or the like, transparent products such as films, threads and the like, which, after washing and drying, are solid and flexible. Consequently the new cellulose derivatives are suitable for many technical purposes for which the cellulose compounds, hitherto obtained by reacting on cellulose with a halogen fatty acid in the presence of an alkali, are unsuitable.

The new cellulose derivatives may be worked up either alone, or mixed with other colloids or binding agents which are soluble in water or in aqueous alkali, into a whole series of industrial products such as artificial fibres (for instance, artificial silk), films, plates, plastic substances, coatings and layers of every description, fabric dressings insoluble in water, sizing for spun materials, thickening agents for textile printing, fixing agents for pigments, binding materials, book cloth and the like.

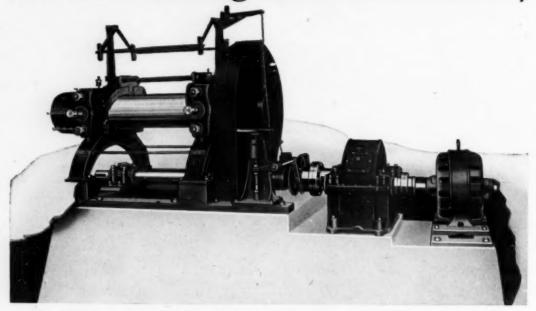
The new cellulose compounds are in many respects superior to

the hitherto known cellulose derivatives which are soluble in alkali and insoluble in water. They are superior to the cellulose-xanthates in their durability both in the solid and dissolved condition, their absence of color, their freedom from byproducts and impurities, the greater readiness with which they may be precipitated in the form of shaped articles (for instance, even by a dilute organic acid), in the fact that they can be precipitated by means of an acid without liberation of hydrogen sulphide and separation of sulphur, the stability of their solutions and the fact that such solutions may be used immediately after precipitation, and in the fact that they can be produced from odorless, incombustible and non-poisonous parent materials. As compared with the alkyl cellulose derivatives, soluble in alkali and insoluble in water (see British specifications Nos. 177,810, 293,346, and 203,-347), the new cellulose derivatives possess the advantages that they may be produced without any extraneous supply of heat and therefore with less risk of depolymerizing the cellulose molecule, that they may be produced more economically and simply, that they are resistant towards water, that is to say the products made therefrom show less tendency to swell, and are more flexible and stronger in the dry state.

Nature of the Products

The new substances are probably hydroxy-paraffin-monocarboxylic acid derivatives of cellulose in which the cellulose has entered into the hydroxyl group of a hydroxy-paraffin-monocarboxylic acid (possibly with the

Farrel-Birmingham—Machinery



Standard FARREL-BIRMINGHAM ROLLS Latest Type

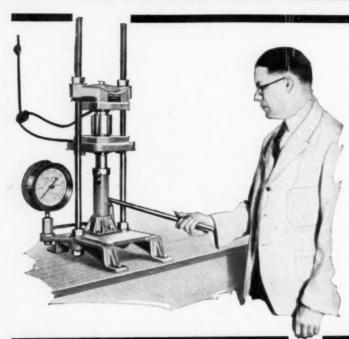
This machine has been especially adapted for working Celluloid, Pyroxylin Plastics and compounds of a similar nature.

These Rolls are furnished in single units or groups of two, three or four machines driven by a single motor and reduction. Each machine is independently controlled by a Farrel-Birmingham Coil Clutch and Brake.

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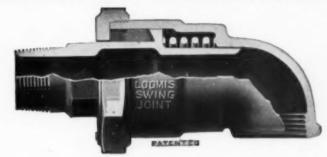
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formation of a lactone or a lactide). Consequently under treatment with a concentrated hydrohalogen acid (such as hydriodic acid or hydrochloric acid), with phosphorus iodide and water, or with a dilute hydro-halogen acid under pressure, they decompose with the elmination of the hydroxy - paraffin - monocarboxylic acid in question.

How the Process Works

The process may be applied in a very simple manner. It consists essentially in treating bleached or unbleached cellulose, or a substance containing cellulose, or a conversion product of cellulose in the presence of an alkali but in the absence of alcohol or in the presence of at the most 20 parts by weight of alcohol for every 100 parts by weight of water present, with a mono-halogen derivative of a fatty acid or a salt or derivative thereof, (for instance, an ester), in either dissolved or undissolved state. This treatment may be carried out at room temperature or below it, or with the application of heat.

The alkali may be added either by soaking the cellulose in an excess of a solution of alkali and removing the excess of alkali solution by pressing, centrifuging or the like, or by mixing or kneading the cellulose with the required quantity of alkali solution or by mixing or kneading the cellulose or alkali-cellulose with solid caustic alkali, or with a mixture of solid caustic alkaline with a saturated alkali solution.

The reaction mixture after the reaction is completed, may be treated for instance, by dissolving it by adding water (if a sufficient excess of unused alkali remains) or by adding dilute alkali solution (for instance, a gaustic soda solution of 3-10 per cent strength) and using for technical purposes the solution or paste so obtained if necessary after previously removing any undissolved substance present by straining or filtering or the like. The product, however, may also be separated from the reaction mixture in various ways.

For instance, the two following methods may be mentioned: The reaction mixture, after neutralizing the free alkali or after acidifying (especially when there is present a large amount of free alkali), is washed with water and the residue dried, if desired, after previously dehydrating it with alcohol. Or the reaction mixture may be dissolved by adding water or dilute alkali solution to the solution of the cellulose derivative, if necessary, filtered, strained or centrifuged, and treated with an acid or with any other agent capable of fixing the alkali (for instance, an ammonium salt) in sufficient quantity for complete precipitation of the product, or in excess; the precipitate is then thoroughly washed with water and, if desired, dried. The substance however isolated may be purified by dissolving it in alkali and precipitating it by means of an acid or the like.

Commercial Applications

Lilienfeld's next patent to be considered is closely related to the one just described and concerns itself with the commercial applications of the cellulose-glycollic acids themselves for the production of plastics, artificial leather, films and filaments. This patent (U. S. P. 1,682,293; Aug. 28, 1928; filed in Austria also on April 4, 1924) describes in short the cellulose glycollic acids and how they are made, stating among other things that they are colorless, highly colloidal and that no expensive solvents are required for their manipulation or conversion into plastics. Their solubility in dilute alkalies, and their subsequent precipitation by neutralizing the solution forms the basis of operations. Besides the use of cellulose glycollic acid, cellulose-lactic acid may be employed.

The present invention consists in dissolving in an alkali, either alone or mixed with binding agents, colloids, or softening agents, a cellulose-oxy-acid insoluble in alkalies, which is obtained by the reaction between cellulose and a halogen derivative of a fatty acid in presence of an alkali, bringing the solution or

paste so obtained into a form of the desired artificial material, if necessary with the addition of a filling material, pigment, dyestuff or softening agent, and treating the formed material, if desired after previously drying it partially or completely with an agent which is capable of precipitating the cellulose-oxyacid. As precipitating agent, there may be used in addition to the substances or mixtures of substances known in the viscose ammoniacal-copper-oxidecellulose industries, also many other substances which are unsuitable for the conversion of viscose into technical products.

The precipitating agent may be used either cold, warm, or hot, in the form of a bath, or of a spray. The washing process and drying process which follow the precipitating are conducted in known manner.

As colloids and softening agents suitable for addition to the cellulose-oxy-acids, the following may be mentioned, for example:

Hydrated cellulose or hydocellulose soluble in alkalies, viscose (cellulose-xanthate in the crude form or purified by any known process, albuminous substances, proteins, glue (gelatine), amyloid, starch starch-like materials, dextrin, gums (such as gum arabic, tragacanth beet gum, or the like), pectous materials, tragasol, resins soluble in alkalies, resinous condensation products soluble in alkalies obtained by the condensation of a phenol, or an aromatic amine, or a urea with an aldehyde, shellac, glycerine, diglycerine, poly-glycerine, glycols, sugar and syrups, soaps, fats, ammonium or alkali-metal derivatives of fatty-sulphonic acids, such as turkey-red oil, and the like.

In Admixture

On account of their colloidal nature, the cellulose-hydroxy-paraffin-moncarboxylic acids may be mixed with colloids or softening agents insoluble in water to produce emulsions or suspensions which do not separate at all, or which do not sep-

(Continued on page 146)

White Synthetic Resins from Acetone

Alcohol soluble product results from condensation of acetone with formaldehyde in presence of an alkali. Many uses suggested

CARLETON ELLIS, of Montvented a resinous compositions made of or containing acetone resin which is white or very light in color and relates particularly to soluble and fusible acetone resin adapted for use as a varnish, lacquer or other coating compound, as a binder in making light colored molding compositions, for impregnating paper and for various other purposes.

The invention involves treating a ketone, such as acetone or methyl acetone, with an aldehyde, such as formaldehyde or its polymers, or mixtures of formaldehyde with other aldehydes, for example acetaldehyde, the reaction being carried out in the presence of an alkali such as caustic soda.

Condensing

To illustrate the procedure involved, 6 parts by weight of acetone and 45 parts of 40 per cent colorless aqueous formaldehyde solution are mixed and 5 parts by weight of a 50 per cent aqueous caustic soda solution are added. These proportions correspond to 6 parts of acetone to 18 parts of actual formaldehyde, or about one molecule of the ketone to six of the aldehyde. On allowing to stand for a few minutes reaction occurs without external heating and considerable heat is evolved. A whitish (nearly colorless), fusible, alcohol-soluble resin or gum is precipitated. This resin or gum is freed from alkali by washing. It then forms a white, soft opaque mass, neither sticky nor elastic, white. The resin is very soluble in alcohol and a 50 per cent solution although viscous flows very easily. When applied to a surface such as a sheet of glass, dried and subsequently baked, colorless remarkably tough films are formed. The baking temperature should be between 125-140° C. for a half hour or more to render the film unaffected by water. A coating of the unbaked resin is affected by water.

Neutral solutions of the resin in alcohol, actone or other appropriate solvent may be employed as lacquers for metals and the like; the coating being applied for example by spraying and the article subsequently baked.

To obtain the white resin it is important to use a high grade formaldehyde as ordinary commercial formaldehyde solution is usually of a brownish color producing a resin of a brownish or strongly yellowish tone.

Clear Transparent Effects

Clear masses of the resin may be obtained by following the material to stand in a warm place to eliminate moisture and solvents. The mass becomes clear and transparent. In this form it may be baked to produce transparent infusible products light in color.

The addition of caustic alkali or other alkaline catalyst acelerates the conversion to a heatresistant product but also tends to bring about some discoloration.

The resin may be mixed with various fillers used in the plastic industry and employed for molding purposes.

Also it may be used as a sizing or coating for paper. Paper

heavily impregnated with the resin may be cut into sheets which are superposed and subjected to pressure and a high temperature to compact the sheets to form a solid block.

It may be noted that the alcohol-soluble resin prepared as above is also soluble in concentrated aqueous hydrochloric acid.

The proportions given in the above illustration may be followed to advantage in making a colorless or substantially colorless product. If the amount of caustic soda is reduced materially a honey-like water-soluble substance is obtained. If the proportion of caustic soda is increased substantially, insoluble products result which cannot be used as solutions useful for various purposes as noted above. It is also desirable not to have the formaldehyde greatly diluted with water, a 40 per cent solution being appropriate for carrying out the reaction. Commercial paraform yields soluble products which sometimes contain a reddish precipitate of an insoluble character. This may be removed by filtration. amount of water in the example will be seen to be only about 11/4 times the weight of the reacting materials (formaldehyde and acetone).

Novelty

Ellis claims:-

1. A fusible resin soluble in alcohol prepared from about one mol. of acetone to six mols. of formaldehyde in the presence of aqueous caustic soda, said resin being substantially colorless.

(Continued on page 153)

Technical Abstract Section A Concise Review of Patents and Literature

Miscellaneous Plastics

Plastic from Rubber Latex and asbestos. William Burton Wescott, assignor to Rubber Latex Research Corp., Boston, Mass. U. S. P. 1,-680,234; Aug. 7, 1928.

1. As a new plastic material, acid washed asbestos and uncoagulated latex.

2. As a new plastic material, acid washed asbestos and gelled latex.

3. As a new material, a plastic composed of acid washed asbestos bonded by an integral body of rubber derived from latex, said rubber permeating the fiber bundles.

6. The process of making asbestos containing plastics which comprises extracting asbestos with acid washing and admixing the extracted asbestos with latex.

Plastics from Peat. Isadore S. Mellanoff, assignor to Kemikal, Inc., Philadelphia, Pa. U. S. P. 1,681,155; Aug. 14, 1928.

Phenol and formaldehyde are condensed in the presence of an alkaline solution of peat. The chemical composition of peat is regarded as a mixture of water, inorganic matter (calcium and iron compounds), vegetable fibers and humus acid (such as humic, ulmic, crenic, apocrenic, etc.). According to H. Borntrager (Zeit. Anal. Chem., 39, 694, 1900; 40, 639, 1901) the black varieties of peat contain as much as 60% of humus acids.

According to Charles A. Davis several substances possessing acid properties have been isolated from peat. Among these substances are humic, ulmic, geic, crenic, pectic and other acids. By some writers these compounds are all classed together under the compounds are all classed together under the compounds are all classed together under the compounds.

der the comprehensive name hums.

Example 1. Phenol 60 parts by weight, commercial formaldehyde 70 parts by weight, peat 20 parts by weight, sodium hydroxide 10 parts by weight.

Rubber and coumaron resin composition. Stuart P. Miller, assignor to The Barrett Co., (New Jersey Corporation). U. S. P. 1,682,397; Aug. 28, 1928.

When about 8% by weight of crude, unvulcanized rubber is dissolved in cumar, of a melting point between 125° C. and 128° C., by melting the cumar and stirring pieces of rubber therein, the melting point of the mixture becomes about 123° C.

Plastic Molded Material of Cork, Rubber and Emery. Raoul Grimoin-Sanson and Herman Danel, of France. U. S. P. 1,688,491; October 23, 1928.

Cork, emery, rubber, fillers and a suitable vulcanizing agent are mixed together and molded to vulcanize the rubber. Proportions given are rubber (gum) 20 kilograms, powdered cork 2.5 kilograms and very fine emery 3 kilograms. The composition is stated to be useful for tires and tubes.

Means for molding drain boards for sinks. James P. Harkin, Thornbury, Australia. U. S. P. 1,688,-232; Oct. 16, 1928.

Rubber or other plastic material is molded to form sink drain boards. In molding apparatus for rubber draining boards an upper mold and a lower mold having apertures therebetween and adapted to produce a rubber draining board, means whereby the mold on the top is adjustably secured to the mold at the bottom, a plurality of removable stop bar plates adapted to be attached between certain parts of the molds, whereby by the attaching or omission of said bars right hand sink draining boards, left hand sink draining boards, or even hand sink draining boards can be formed by the same apparatus.

Floor covering of molded linoleum tile. Charles F. Humphreys and John C. McCarthy, assignors to Armstrong Cork Co., Pittsburgh, Pa. U. S. P. 1,630,085; May 24, 1927.

In the process of making tile pattern molded inlaid linoleum, the steps which consist in applying to a backing a layer formed of granular linoleum mixes colored to simulate tiles and mortar joints between the tiles, consolidating the granular linoleum material into a sheet consisting of colored inlays simulating tiles and separating mortar joints and having irregular lines of juncture, and depressing the surface of the inlays simulating the mortar joints below the general surface level of the linoleum, and curing the linoleum.

As a new article of manufacture, a molded inlaid linoleum floor covering having a tile pattern formed of molded inlays colored and arranged to simulate tiles separated by mortar joints and having irregular lines of juncture between the inlays, and having the inlays simulating the mortar joints depressed below the general surface level of the linoleum.

Furfural Acid Resin. Linwood T. Richardson, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. U. S. P. 1,682,934; Sept. 4, 1928.

Ten parts commercial furfural and two parts concentrated sulphuric acid are brought together and thoroughly mixed, whereupon reaction takes place spontaneously with production of a gelatinous substance capable of transformation either automatically or otherwise to a state of hardness. The resultant product is characterized by brilliant natural superficial finish and shininess of fracture exposed surfaces indicating density of structure and substantial absence of porosity.

Other acids such as phosphoric, or hydrochloric may be used. Halogens as bromine or sulphur chloride or sulphural chloride may be employed.

Molding Composite Cork Bodies. William F. Grupe, assignor to Boucher Cork Co., New York. U. S. P. 1,689,584; Oct. 30, 1928.

10. The method of producing molded products of corks, which comprises withdrawing moisture inherent in cork particles by subjecting the cork particles to an elevated temperature under the condition of free expansion and low pressure and thereafter subjecting the heated cork particles to molding compression while excluding air from and preventing combustion thereof.

Producing Styrol from Chloroethyl benzene by cracking. Omar H. Smith, asignor to Naugatuck Chemical Co., Naugatuck, Conn. U. S. P. 1,687,903; Oct. 16, 1928.

The essential feature is the cracking of chlorinated ethyl benzene by passing the same through a red hot tube made of nichrome or similar alloy. Among the decomposition products styrol is found in considerable amounts. The reaction probably takes the following course. $C_0H_5CHClCH_3-C_0H_5CH:CH_2+HCl$

Flame proof electrical insulation of

Flame proof electrical insulation of rubber, chloronaphthalene, silica and vulcanizing agents. Earl G. Sturdevant, assignor to Western Electric Co., New York, U. S. P. 1,-687,525; Oct. 16, 1928. 2. Electrical insulation comprising

2. Electrical insulation comprising substantially 20 parts of rubber, 25 parts of chlorinated naphthalene, 2 parts of sulphur, 10 parts of litharge, and 33 parts of powdered silica.

Cellulose Compounds

Motion Picture Film Strip; Cellulose ester Varnishes and Cements. Frank W. Lovejoy, assignor to Eastman Kodak Co.. Rochester, N. Y. U. S. P. 1,687,100; 1,687.048; and U. S. P. 1,687,044; Oct. 9, 1928.

The invention relates primarily to the production of motion-picture film cartridges for amateur use, paper covered for daylight loading. Incidentally there are disclosed two formulas for cementing cellulose ester plastics together, or causing paper to adhere thereto.

If the film or sheet is one of the



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Technical Abstracts

50

common pyroxylin type, the cement or varnish used to cause it to adhere to the paper may be the following:

	Parts
b	y weight
Cellulose nitrate	10
Fusel oil or butyl alcohol	50
Methyl alcohol	
Camphor	2-40
If the film embodies cally	1000 000

If the film embodies cellulose acetate or ether, other well known formulae suitable for use with them would be used, such as:

	Parts
	by weight
Cellulose acetate	100
Diethyl Phthalate	. 10-50
Acetone	
or	
Water-insoluble ethyl cellule Toluol	
Volatile solvent (mixture o methyl acetate with one ninth its weight of methy	9
alcohol)	. 400-2000
The second patent mention	oned gives
the following formula:	
	Parts
	by weight
Cellulose nitrate	. 100

Lowering tendency of cellulose nitrate film to be marred by static markings. Ray L. Stinchfield, assignor to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,683,315; Sept. 4, 1928.

Methyl alcohol..... 900-1500

Fusel oil or butyl alcohol

Camphor

The rear surface of cellulose nitrate film is superficially hydrolized by treatment with ½ to 5% solutions of an alkali such as ammonia, sodium hydroxide or potassium hydroxide. This prevents static by rendering the rear surface not susceptible to electrification by friction.

Manufacture of cellulose acetate soluble in chloroform. Harry Le B. Gray and Cyril J. Stand, assignors to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,683,347; Sept. 4, 1928.

In the process of making cellulose acetate, pretreating the cellulose with glacial acetic acid containing a mixed catalyst of sulfuric and phosphoric acids in which the latter acid is from one to five times the weight of the former, said mixed catalyst being less than 10% of the weight of the cellulose, and said pretreatment being conducted at a temperature below 40° C. until between 1 and 3.5% of acetyl has been combined with the cellulose, cooling the mass to at least room temperature, stirring in acetic anhydrid to complete the acetylation, said acetylation being conducted at a temperature between 35° and 60° C. until the product is chloroform-soluble, the same mixed catalyst serving both in the pretreatment and in the final acetylation.

Wire-reinforced transparent pyroxylin sheets, and making the same. Mittie T. Brush, U. S. P. 1,686,649; Oct. 9, 1928.

Thin woven wire (like poultry wire in pattern, but not over #0.004—0.008) is surrounded with a stiffened cotton frame and incorporated between two thin sheets of pyroxylin plastic. Use:—automobile curtain windows.

Celluloid Collar. Ernest P. Parsons, assignor to Parsons & Parsons Co., Cleveland, O. U. S. P. 1,687,177; Oct. 9, 1928.

2. A collar of celluloid material, having a neck band provided with a plurality of slots at each meeting end thereof, button-hole tabs having slots adapted to register with the slots in the band, locking pieces for said parts extending through both sets of said slots, said band and tabs and locking pieces being cemented together.

Cellulose Esters containing a halogensubstituted chain; Cellulose bibromobutyro-stearate and process of making the same. Hans T. Clarke and Carl J. Malm, assignors to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,687,060; Oct. 9, 1928.

Y. U. S. P. 1,687,060; Oct. 9, 1928. Describes in detail the preparation of a new class of cellulose esters which comprises the esterification of the cellulose with cinnamic acid and chloroacetic anhydride, using magnesium perchlorate as the catalyst. Cellulose cinnamate results. This product is then brominated in chloroform solution and forms cellulose alpha-beta dibromophenyl-propionate. Films made from this are virtually incombustible due to the bromine present. Other examples include the use of crotonic acid forming cellulose crotonate and the corresponding brominated derivatives. The main object is to produce cellulose esters that yield highly flexible films that are incombustible. Rayon fibers made by the cuprammonium process may form the raw material. Some of the claims comprise:

19. A cellulose ester in which there is an acyl group containing a halogen-substituted chain and a stearyl

group.
20. Cellulose dibromobutyro-stearate.

21. The process of making substituted organic esters of cellulose which comprises treating cellulose material containing unesterified hydroxyl groups with an acylating agent containing an unsaturated acyl group until a cellulose ester is formed containing such an unsaturated group and subjecting said ester to a halogenating agent, until at least an addition of halogen is made at the unsaturated part of said acyl group.

Esterifying Mercerized Cellulose with Lower Fatty Acids. Hans T. Clarke and Carl J. Malm, assignors to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,687,059; Oct. 9, 1928. Concerns the manufacture of cellulose esters of the acids from the group comprising acetic, propionic,

butyric, valeric, caproic and heptylic

acids, starting with a mercerized form of cellulose. By this method the use of anhydrides (such as acetic anhydride) is avoided, and the cellulose is but very little depolymerized or broken down by the esterification, The process is described as

1. In the process of making a cellulose ester of a fatty acid, mercerizing the cellulose and thereafter heating together the mercerized cellulose and a fatty acid having more than 1 and less than 8 carbon atoms without a catalyst at a temperature between 100° and 170° C. inclusive until the acyl group in the ester thus produced reaches at least 8%, said acid being the sole acylating agent.

Sulphonated-Cellulose Derivatives and Process of Preparing Them. Georg Kranzlein, Arthur Voss, and Franz Brunntrager, assignors to I. G. Farbenindustrie Aktiengesellschaft of Frankfort-On-The-Main, Germany. U. S. P. 1,682,382; Aug. 28, 1928.

Water-soluble cellulose compounds are prepared from mercerized cellulose by treatment with sodium benzylchloride-para-sulfonate. For example:

18 parts of mercerized cellulose are kneaded for 2 hours with 100 parts by weight of an alcoholic caustic soda solution of 20% strength. After having added to the mass 22.8 parts by weight of sodium benzylchloride-para-sulphonate in 100 parts by volume of alcohol, the mixture is again kneaded for 8 hours at 50° to 60° C., whereupon the alcohol is removed by evaporation. The residue forms a whitish mass which is readily soluble in water, rather difficultly soluble in alcohol and almost insoluble in acetone and benzene.

By treating aqueous solutions of this with heavy metals salts, such as aluminum salts, insoluble compounds are formed. Impregnation of fabrics and manufacture of films and plastics are suggested as possibilities of the uses of the new products.

Phenol Resins

Molded Caster of Phenol resin with rubber tread or tire. Le Bonsleur, Elyria, O. U. S. P. 1,686,142; Oct. 2, 1928.

A caster wheel comprising a frame of phenolic condensation product and a rubber tire, all molded integrally into a unitary structure.

Phenol resins (Karbolite) made with powdered metals as catalysts. Grigori Petroff (of Moscow, Russia) and Peter Shestakoff (of Paris, France). U. S. P. 1,684,142; Sept. 11.1928.

Example 1.—100 parts of cresylic acid (90-100%) or commercial carbolic acid, 100 parts of 36% formaldehyde solution, 10 parts of pulverized lead are mixed and heated in a closed vessel up to 5°-85° C. for 10 to 15 hours. The mixture is allowed to stratify and the upper water layer separated from the lower oily layer. The lower oily layer is heated in a vacuum in order to completely evaporate any water remaining in the oily material. As an alternative way of removing the water, the oily layer

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heating the dried oily material, it changes into a hard resin soluble in alcohol and acetone. The hard resinous product may be employed to make lacquers.

To change the dried initial fluent condensation product into a hard, in-soluble, plastic mass, it is mixed with two parts of a or 6 naphthalene sulfonic acid dissolved in a mixture of 10 parts of trichlorethylene containing 10 parts of fatty acids derived from castor oil. The resulting mass is never of into mode and on beating a poured into molds and on heating a hard, infusible product is obtained.

(This is quite evidently the Karbo-lite described in PLASTICS 1927, 3, p. 391 and 436, which see).

Nitrogenous Phenol Resins; anilinephenol-formaldehyde condensation products. Fritz Seebach, assignor Bakelite Gesellochaft, at Berlin-Charlottenburg, Germany. U. S. P. 1,683,701; Sept. 11, 1928.

Example 1.—120 kilograms of commercial liquid phenol, 40 kilograms of aniline, 160 kilograms of aqueous formaldehyde solution (40%) agitated for some minutes and then allowed to stand. At about 30 de-grees centigrade the mixture solidifies forming agglomerated crystals. After spontaneous rising of the temper-atures to about 40 degrees centigrade and reliquefication the mess is ag-itated for ½ to ½ hour. The aque-ous liquid or layer is separated by ous liquid or layer is separated by decantation or by distillation. The resin may be evaporated until the temperature of about 150 degrees centrigrade is reached. After having been cooled the color of the resin is orange yellow without a peculiar odor, soluble in the common organic solvents as alcohol, acetone, ether, benzene, or mixtures of them. The resin has novolak character.

Purifying phenol resins by precipita-

tion in presence of soaps. Fritz Seebach, assignor to Bakelite Ge-sellschaft, Berlin, Germany. U. S. P. 1,683,702; Sept. 11, 1928. 60 kilograms of phenolformalde-hyde resin are dissolved in 40 kilo-grams of 95% ethyl alcohol and 100 litres of a solution containing 2.5% litres of a solution containing 2.5% of sodium soap are added. The emulsion formed is added to 18 litres of caustic soda solution, agitated, or preferably homogenized for instance by pressing through small openings, and mixed with 100 litres of a solution containing 1% of soda soap agitating the mixture. The process may be carried out at ordinary temperature or at 50-70 degrees centigrade.

Casein

Indurating Thick Casein Plastic Articles. Wilford J. Hawkins, assignor to American Machine & Foundry Co., U. S. P. 1,689,386; Oct. 30, 1928. In making toilet seats from casein and similar plastics that require hardening in a formaldehyde bath, a tubular insert is provided through which lar insert is provided, through which the hardening fluid may enter dur-ing the "curing" process. This en-ables the hardening to be effected much more rapidly and completely.

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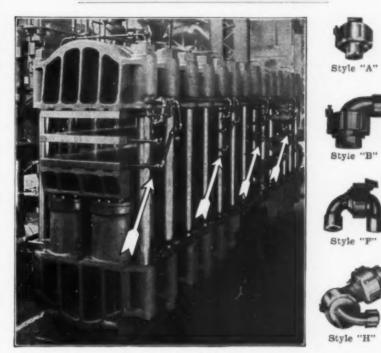
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Testing Electrical Insulation at Radio Frequencies

Tentative Standards Serial D-175-25T of the American Society for Testing Materials

THIS is a Tentative Standard, published for the purpose of eliciting criticism and suggestions, and as such is subject to annual revision.

Issued, 1923; Revised, 1925.

Scope

1. This method of test is intended to determine the dielectric failure of electrical insulating materials at radio frequencies.

The failure under radio frequency stress may take the form of charring, buckling, cracking, blistering, softening or chemical decomposition. Failure through the material is not abrupt and it, therefore, requires a certain amount of judgment on the part of the operator to decide just what constitutes failure in any particular case.

When a sheet of insulating material is tested between two

metal electrodes passing it, through the heat generated inwith creases the thickness of the material, while the To Source of Filament Supply To Source of Plate Supply Fig. 1—Showing a circuit capable of developing radio frequency alterations for testing purposes. These tentative standard methods of testing plastics used for electrical insulation, are published by special permission of the above society.

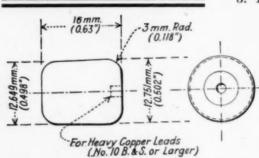


Fig. 2—Showing dimensions of the electrodes used.

radiating surface remains nearly constant. Consequently, as the thickness of the sample is increased the voltage at which failure occurs will decrease. As sufficient data are not available to allow results to be translated from one thickness to another, it is necessary that all comparative tests be made on sample of the same thickness. Hence, in the standard method given below, a definite thickness of sample is specified. This method, of course, is applicable to other thicknesses of material, but when so used the results should be compared only with similar tests made on like thicknesses of material.

APPARATUS Generating Circuit

2. Any type of generator having an output of 500 watts or more and generating continuous waves of 100 and 1000 kilocycles per second, respectively, and at Voltages up to 5000 or 10,000 volts, depending upon the class of materials

tested, is satisfactory. If desired, a circuit similar to that shown in Fig. 1 may be used.

Voltmeter

3. The voltage may be measured by means of the current through a shielded radio frequency ammeter in series with a small shielded air condenser of known capacity across the test terminals or by means of an electrostatic volt-meter

designed to withstand radio frequency potentials. Suitable scales shall be provided so that reasonable accuracy will be obtained when measuring any testing voltages up to the maximum desired.

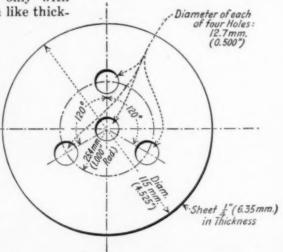
If the ammeter method is used:

E (in volts) =
$$\frac{16 \text{ Ix} 10^7}{\text{fC}}$$

where I = current in amperes; f = frequency in kilo-

cycles per second;;

C = capacity of air condenser in micromicrofarads.



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Note.—In the above formula, the value 16 is an approximation, 15.92 being the exact value.

Frequency Meter

4. The frequency meter or wave meter may be of any commercial design covering the required frequency or wave lengths and accurate to within ± 10 per cent over wave frequency range used.

Electrodes

5. (a) The electrodes shall be of brass and shall be clean and

(b) The electrodes shall have the dimensions shown in Fig. 2. TEST SPECIMENS

6. (a) The specimens shall be representative of the material to be tested, care being taken to select material free from abnormal defects.

(b) The specimens shall be 6.35 mm. (0.25 in.) in thickness and may be of any convenient size or shape provided that the center electrode (see Fig. 3) is at least 57.5 mm. (2.264 in.) from the outside edge at all points. Other thicknesses may be used but the results therefrom should be used strictly for comparative purposes as explained under Section 1. If any samples are milled to reduce the thickness, care should be taken not to tear, chip or otherwise change the character of the ma-Four holes 12.7 mm. (0.5 in.) in diameter, shall be provided in each specimen, one in the center and three equally spaced in a circle of 25.4 mm. (1.000 in.) radius as shown in Fig. 3.

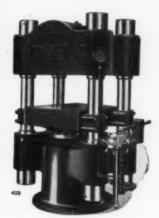
PROCEDURE

Surrounding Medium and Wave Frequency

7. (a) Two specimens shall be tested in the condition received at normal room temperature of about 20° C. (68° F.), one of these at 100 kilocycles per second (3000 meters wave length) and the other at 1000 kilocycles per (300 meters second wave length).

(b) Similarly, an additional two specimens shall be tested respectively, at the frequencies specified in Paragraph (a) after the specimens have been immersed in distilled water at a

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temperature of about 20° C. (68° F.) for 48 hours. After removing the specimens from the water, the surface water shall be wiped off with a clean absorbent cloth and the specimens then allowed to stand in the room away from drafts and direct sunlight for 5 minutes. The holes shall be drilled before immersion.

Fig. 3.—Test Specimen

Position of Electrodes in Specimens 8. One electrode (Fig. 2) shall be inserted in the center hole in a specimen and a similar electrode in one of the other The electrodes three holes. must be a tight fit, otherwise corona may form at comparatively low voltage and destroy the material.

Connection of Electrodes to Test Terminals

9. The electrodes shall then be connected to the test terminals of the radio-frequency generator. One side of the generator shall be grounded, and this terminal shall be connected to the center electrode of the specimen. The reason for this is that the failure generally occurs around the high potential terminal and this will allow the two subsequent tests to be made between the center and the other two holes, the center not being destroyed.

Application of Voltage 10. For materials which ordinarily fail below 3000 volts, the voltage shall be raised in steps of 500 volts. For materials which ordinarily fail above 3000 volts, the voltage shall be raised in steps of 1000 volts. Wherever possible, the initial voltage chosen shall be such that at least three voltage steps will be required to cause failure of the material.

Test Period

11. The voltage at each step shall be impressed for two minutes, the testing period being counted from the instant when the prescribed voltage is reached, and the time required to reach this voltage not exceeding 1/4 minute. Wherever samples thicker than that specified are used, this testing period should be changed to three minutes.

Number of Tests

12. Tests shall be made between the center hole and each of the other three holes of each specimen, the specimens being allowed to cool to room temperature after each test.

The average of these three voltages shall be considered as the dielectric strength of the specimen under the conditions of the tests.

REPORT

Report

13. The report shall include the following:

(a) The description of the material, i. e., base or filler, binder, grade, color and nature of surface of specimen between electrodes;

(b) Room temperature and relative humidity;

(c) Voltage at which each dielectric failure occurs, average voltage, duration of application of final voltage, and wave frequency.

(d) Thickness of specimen at electrodes:

(e) Nature of failure.

Criticisms of this Tentative Method are solicited and should be directed to Mr. T. S. Taylor, Secretary of Committee D-9 on Electrical Insulating Materials, Bakelite Corporation, 230 Grove St., Bloomfield, N. J.

A high-frequency dielectric endurance test is being developed and will later be included in this tentative standard.

New Cellulose Compounds

(Continued from page 138)

arate readily. Their solutions or pastes may therefore be mixed with agents such as india rubber, gutta percha, balata, fats, drying or nondrying oils, metallic salts of fatty acids, and the like.

The new cellulose derivatives are especially suitable for the manufacture of the following artificial materials:

Artificial threads, particularly artificial silk; films, coatings and layers of every kind; dressings insoluble in water for woven textiles, paper, leather and the like; sizes for use in spinning; book cloth; artificial leather, adhesives and cements; thickening agents or agents for fixing pigments in textile printing; plates, and plastics materials in general; and the like.

The following examples illustrate the invention, the parts being by weight:

I. Films.

1. 100 parts of a celluloseglycollic acid or cellulose-lactic acid insoluble in water but soluble in dilute alkalies, are dissolved, whilst kneading or stirring or the like, in 900-1200 parts of caustic soda solution of 5-6 per cent strength. The solution, after filtering if necessary, is distributed in the shape of a layer by means of a suitable hopper and coagulated by a solution of sulphuric acid of 10-20 per cent strength, of acetic acid of 25 per cent strength, of ammonium chloride of 30 per cent strength, of tannin of 20 per cent strength, or of formaldehyde of 40 per cent strength, or by means of any other precipitating bath known in the viscose industry, for example one composed of sulphuric acid, a salt, and an organic substance such as sugar. The solidified film is washed thoroughly with water and dried. The endless film may be treated before or after drying with an aqueous solution of glycerine (for instance, of 10 per cent strength) in order to increase its flexibility.

The third patent is closely related to the first one mentioned in the present connection. It is U. S. P. 1,682,294; Aug. 28, 1928 (an equivalent Austrian application having been filed on April 4, 1924). It described in detail the production of cellulose glycollic acid from ordinary sulfite cellulose, used either in fleece or in sheet form, although cotton linters may also be used. Alkali cellulose is first prepared and this is then subjected to the action of monochloroacetic acid dissolved in water (25 to 30 parts of water to 50 to 55 parts of the acid). After a few hours treatment it will be found that a product soluble in dilute alkalies has been produced. The mass is then separated from the

monochloroacetic acid and washed and thereupon dissolved in a large quantity of dilute sodium hydroxide solution strength). From the filtered solution in alkali the desired cellulose glycollic acid is precipitated by acidfication with acetic acid or with dilute sulfuric acid.

Improvements in Making Cellulose Ethers

In the manufacture of cellulose ethers, such as ethyl cellulose, the starting material is alkali cellulose; that is to say cellulose that has been treated with solutions of sodium hydroxide, and has then been squeezed to eliminate a certain amount of water. The three patents now to be considered deal with an improvement in this process in that more water than usual is eliminated from the alkali cellu-Etherification then fol-

According to the first of these patents (U. S. P. 1,683,681; Sept. 11, 1928):-

100 parts of sulfite cellulose are impregnated with 900 to 1000 parts of 15 to 18% sodium hydroxide solution and allowed to stand for 24 to 72 hours. The mass is then pressed to a weight of 200 to 250 parts and comminuted in a disintegrator. The material may stand for 2 to 3 days or may be dried at once in a vacuum at room temperature to constant weight. The final weight is about 120 to 130 parts. The water content tests about 1 to 5% at 100 to 105° C. 100 to 125 parts of powdered sodium hydroxide are slowly kneaded into the dried alkali cellulose in a suitable machine (kneading machine, disintegrator, edge runner, or similar machine), with The kneading takes cooling. place in the presence of air so that during 4 hours of kneading 40 to 60 parts of water are absorbed. A further 60 to 40 parts of water are then kneaded in so that the total amount of water added is 100 parts. Then the mass is heated in an autoclave with 160 to 250 parts of ethyl chloride for 6 to 24 hours at a temperature of 90 to 130° C.

(Continued on page 150)

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Improved Type of Die for Molding Pieces with Re-entrant Angles

Mold plate with removable inserts is used in the making of pulleys

molding device especially producing suitable for molded phenoplastic pulleys and similar articles is described by Herman Paul Sachse, of Chicago, in a patent (U. S. P. 1,687,-797) issued on Oct. 16, 1928, to the Central Scientific Co., of Chicago. The mold itself is provided with interchangeable mold blocks for molding articles of different shapes and sizes. By changing the matrices, the dimensions of the articles may be

Fig. 1 is a plan view of the mold plate, showing the molds in position, with the upper platen removed:

Fig. 2 is a vertical section of the mold plate, the platens and the molds in assembled relation;

Fig. 3 is an exploded view of the section shown in Fig. 2.

In molding articles having reentrant curves and angles, as pulleys and the like, great difficulty has been experienced in obtaining a mold that will properly form the articles under the pressures that are necessary, and at the same time be so constructed that the articles can be readily removed after they have been molded.

Using Mold Plates

The present invention contemplates the use of a mold so divided that the molded article may be readily removed therefrom, and one in which the parts are firmly held in assembled relation during the pressing operation.

A device for molding phenoplastic pulleys has been selected by way of example to illustrate one embodiment of the invention. On the drawings, the reference character 10 designates a metallic mold plate through which are one or more, prefer-

ably a plurality, of openings 11 of the same dimensions and similar contour. The openings shown are circular, but it is understood they may be otherwise.

The members for forming the cavity of the mold, which for convenience of description will be termed the matrix or mold 20, each comprises a plurality of mold blocks 12 and 13 which together are adapted to make a close fit in any one of said openings. As shown, two duplicate blocks for each opening are employed. These blocks together form a two-part ring, split through its diameter, transversely. The inner periphery of these rings is provided, in the present instance, with inwardly extending V-shape projections 14 and 15, respectively, in the central horizontal plane of said blocks. A cope block 16 having a boss 17 with a nowel plate 160 are adapted to engage in the upper and lower portions of the opening formed by said ring. The cope blocks and nowel

plates are preferably duplicates. The mold, cope and nowel blocks together form a matrix for the pulley.

The external diameters of the molds or matrices and their thicknesses are the same, but their interior diameters will depend on the diameters of the pulleys to be molded. By means of this arrangement the molds are interchangeable, and the complemental parts of each mold being duplicates, the parts may be readily assembled.

The mold plate 10 is adapted to be placed between upper and lower platens 18 and 19, respectively. Dowel pins 21 extending through the upper platen 18, the mold plate 10 and into the lower platen 19, are adapted to guide and position the parts during the pressing operation.

Molding

The mold or matrix described above is adapted to form a pulley 22 having a solid hub 23. If it is desired to have an axial opening through the hub of the pulley the nowel plate 170 is provided with an axial opening in which a pin 26 is adapted to be secured. The pin 26 extends through the cavity of the mold and will form the axial opening 24 in the hub of the pulley 25.

In devices for molding phenolic compounds and other materials that are plastic or semi-plastic, at high temperatures, it is the common practice to apply both heat and pressure to the mold during the molding operation, but since the means for heating and applying pressure to the molds constitutes no part of the invention, it was not thought necessary to illustrate or describe the same.

In the operation of the device, the upper platen or plate 18 is removed and the mold blocks and mold plates for forming the desired size of pulley are inserted in the openings 11, the proper amount of material for forming the pulleys is inserted in the mold cavities, the cope plates 16 are inserted, and the upper platen placed in position, after which heat and pressure are applied by a press in the usual manner.

In removing the articles from the mold, the platen 18 and the mold plate 10 are lifted, leaving the molds or matrices 20 in position on the lower platen. The mold blocks 12 and 13 are now separated laterally, the cope plate 16 lifted from the article and the article removed.

While the mold for forming pulleys has been described it is understood that other articles may be formed by changing the contour of the surfaces forming the mold cavity.

Soviet Russia Gets Pyroxylin Plastics Plant

The Union of Russian Socialist Soviet Republics has recently granted permission to a Polish syndicate to employ a plant located at Leningrad for the manufacture of articles from celluloid, casein plastics and other artificial horn. The agreement permits this syndicate to carry on the manufacture of combs, toys, toothbrushes and similar articles, and is for a period of 15 years.

Lower Prices Will Stimulate Use

The greatly lower prices prevailing in the field of molding powders makes them available for uses that hitherto were impracticable because of the expense. Wholesale replacement of metal in ship's fittings, in public structures and in the home will enable producers to realize as big a profit as before—but based on greater volume of business.



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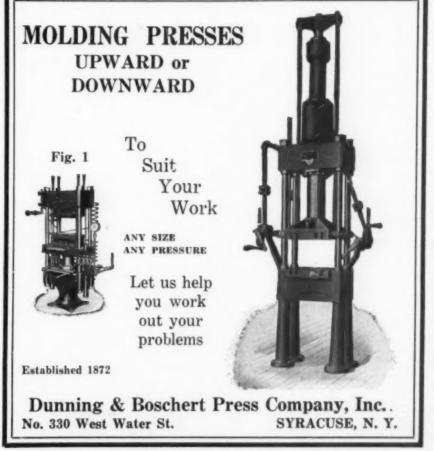
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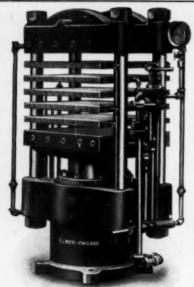
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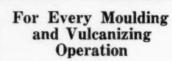
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Cellulose Compounds

(Continued from page 147)

During the reaction the mass is either stirred or the autoclave is kept in motion. After cooling the autoclave is opened and emptied. The reaction product is placed on a filter and thoroughly washed, the precipitate mixed with dilute sulfuric acid and allowed to stand for a longer or shorter time, filtered and again thoroughly washed and then dried.

The resulting product is about 100 parts of a coarse sandy powder which readily dissolves in many organic solvents (such as for instance benzol, alcohol, benzol-alcohol mixture, chloroform, chloroform-methyl-alcohol mixture, methyl acetate, glacial acetic acid, etc.,) the solutions (even without filtration) on evaporating leave clear, fibrefree, water-resistant and flexible films.

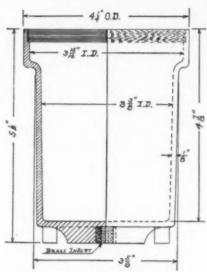
A further modification of the process of making ethyl cellulose is described in the next patent (U. S. P. 1,683,682; Sept. 11, 1928). The drying of the alkali cellulose in vacuo at temperatures below 18° C. is one of the features. The dried alkali cellulose (which however still contains from 10 to 25% of moisture) is then placed into an autoclave with ethyl chloride and heated to 90-100° C. for from 10 to 24 hours, whilst being kept constantly agitated. After cooling in the autoclave, the contents thereof are removed and the resulting ethyl-cellulose is mixed with water and washed, and then treated with an acid, and again washed. It forms a powdery, flocculent substance soluble in benzene-alcohol mixtures, in chloroform, alcohol, chloroform-alcohol mixtures and a number of other solvents. The drying step below 18° C. is specifically claimed.

The last of this group of patents covers the details of the preparation of cellulose ethers wherein intermediate products of relatively low etherification are first made, and the addition

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of further groups of alkylating agents carried out later on. The patent covers 11 pages and has no less than 44 claims. Only one of the numerous examples can here be given. For instance

Example I

100 parts of preferably dried sulfite cellulose are mixed with 50 parts of a 50% sodium hydroxide solution in a mixing or kneading apparatus, (such as for instance a disintegrator, kneading machine, mill, edge runner or the like), until the mass has become homogenous. The process is preferably carried out with cooling. The mixing time varies from 3 to 24 hours depending on the effectiveness of the mixing apparatus and the

machine should preferably be kept closed from the outside air, during the mixing. The resulting product is a fine, flocculent mass, having a water content of 16 to 22% (as shown by drying at 100 to 105° C.), the amount depending on the water content of the cellulose initially used.

The mass may be allowed to stand for several days in a room which is not too warm (e. g. not over 5 to 20° C.) or it can be used immediately. The material is placed in an autoclave and 30 to 50 parts of ethyl chloride are added, the autoclave is closed and heated for 6 to 20 hours at 90 to 120° C. It is advisable to stir the material during the reaction or to keep the autoclave in motion.

The final product of the reaction which contains the intermediate is a flocculent mass with an alkaline reaction. A test sample is washed with hot water and the test shows the following solubilities:

86 to 90% in 8% sodium hydroxide solution,

0.4 to 0.5% in glacial acetic acid,

1 to 2% in 60% acetic acid and

99.2% to 100% in concentrated hydrochloric acid.

The solution of the washed product, or washed reaction mixture containing the intermediate, in dilute sodium hydroxide solution for example 10%, is quite viscous and when precipitated with acid or other viscose

precipitants (if necessary after filtering or straining), it yields a continuous film which after being washed and dried is shown to be flexible.

The separation and purification of the intermediate can proceed as follows: The reaction mixture is washed with hot water, treated with dilute acid if necessary, again washed with water and dried, or the crude reaction mass can be washed with hot water if desired or dissolved directly in dilute sodium hydroxide solution, (for instance 10%), filtered or strained if necessary and the filtrate neutralized or acidified, whereupon the intermediate precipitates can be collected on a filter, washed and dried. The purified product dissolves to a clear solution and will keep indefinitely.

If the pure intermediate is not desired for coatings, artificial silk, films, or plastics, and if the intermediate is to be transformed into cellulose ethers of a higher degree of etherification the intermediate or the crude reaction mixture is mixed with 60 to 100 parts of solid caustic soda, (or an equivalent amount of strong sodium or potassium hydroxide solution or a mixture of strong sodium hydroxide solution and solid caustic soda), the mixing being preferably carried out with stirring, kneading or other mixing means and it is likewise advisable to provide cooling. The mass absorbs more or less water from the air depending on the moisture content of the air and the time of mixing, (for example 10 to 120 parts). The mass is then placed

in an autoclave having stirring or rotating means and 100 to 160 parts of ethyl chloride is added. The autoclave is then heated for 6 to 24 hours at a temperature of 90 to 150° C. referably with stirring or rotation of the autoclave.

The resulting product feels more or less dry and after acidifying to remove by-products if required, it is washed with water, or with water then with an acid and then again with water and dried.

The dried ethyl cellulose is soluble in volatile solvents, (for instance alcohol, benzol, alcoholbenzol mixture, glacial acetic acid, chloroform, chloroform-alcohol mixture, methyl-acetatemethyl-alcohol mixture, etc.). When spread in thin layers and dried these solutions yield a flexible film.

Glutin As Source of Plastics

(Continued from page 131)

separating metallic salt solution and not a stoichiometrical proportion of the same, thus differing from the neutral reaction as is the case during the formation of metal-hydroxids.

The separated metal glutin is freed from the salts in excess by washing the same in water. For instance, in case aluminum sulfate is employed for forming aluminum glutin, the aluminum or the salt solution of that metal contained in the resulting glutin metal combination will amount to 5.9%, while the sulphate embodied in the same amount to 10.25%.

From the above it is seen, that the metalglutin also contains the anion of the separating salt. Therefore such metal-glutins can also be produced, wherein the glutin embodies inorganic or organic anions, which otherwise form with the metal-ions water-insoluble or difficultly soluble salts (for instance phosphates, silicates or various organic acid salts.)

These combinations can be produced in the following manner:—

- 1. The metal-glutin obtained and washed out in the described manner is treated with the aqueous solution of the alkalimetal-salts of the corresponding anions, whereby the anions are exchanged.
- 2. During the production of the metal-glutins, the alkalimetal-salts of the corresponding anions are added to the reaction-mixture in the following manner:—
- (a) Simultaneously with the separating salt, or
- (b) First a part of the metalsalt solution, thereafter the alkali-metal-salt of the corresponding anions, and finally the rest of the metal-salt.

Example

1. A glutin-solution may be derived from animal wastes which contain a glue-rendering tissue called ossein and which can be converted into glutin by cooking it with water at high temperatures. The resulting raw solution, of course, is a glutin-solution. By concentrating this solution by evaporation, one obtains the gelatinous form,

which by dissolving again in water render a glutin-solution. A 20% glutin-solution is alkalized in such a manner, that for each liter of the solution are added 370 ccm. of a 5.41% solution of caustic soda. By sufficient agitation the alkali is well distributed and combined with the glutin, and then 630 cc. of an aluminum-sulfate solution, containing about 152 grammes of aluminum-sulfate per liter, are added to each liter of the glutin-solution.

The reaction mixture gradually becomes thicker until it is of a pasty consistency. The drying takes place gradually. After some hours the mass can be compressed and repeatedly washed with water, thereby removing excess salt. During the reaction the temperature is to be maintained at about 28° centigrade.

2. If it is desired to produce the zinc-combinations of the glutin instead of the aluminum-salts, the procedure is the same as above mentioned, but in place of the aluminum-sulfate solution I employ 630 ccm. of a zinc-sulfate solution, containing 215 grams of zinc-sulfate per liter, for each liter of the glutin-solution.

Acetone Resins

(Continued from page 138)

The process also is covered by additional claims.

3. A process which comprises mixing about one molecular equivalent of a lower aliphatic ketone with six molecular equivalents of formaldehyde in the form of an aqueous solution, and an alkaline condensing catalyst, and thereafter removing the latter, while the resin product is soluble in alcohol, the total amount of water present being not substantially greater than 11/4 times the total amount of reacting substances.

4. A process which comprises mixing about one molecular equivalent of a lower aliphatic ketone with six molecular equivalents of formaldehyde in the form of an aqueous solution, and a caustic alkali as a condensing catalyst, and thereafter removing the latter, while the resin product is soluble in alcohol, the total amount of water present being not substantially greater than 1½ times the total amount of reacting substances.

Pyroxylin As An Imitative Material

(Continued from page 134)

on account of the excessive first cost of the horn, the same being principally brought from South Africa, and on account of the labor required to manipulate the same to form the required articles therefrom."

"In the production of small articles, as buttons, the horns of animals mentioned are usually softened by steeping in water, then cutting or working by placing in a chuck to assume the required forms and also to develop the edge grain thereof, and then polishing for use. One of the principal objections, however, that has been met with in the adaptation of horn for use as the hooked handles of umbrella sticks has been the difficulty experienced in securing horn long enough and sufficiently solid for the purpose, and even when it has been possible to obtain such character of horn the excessive

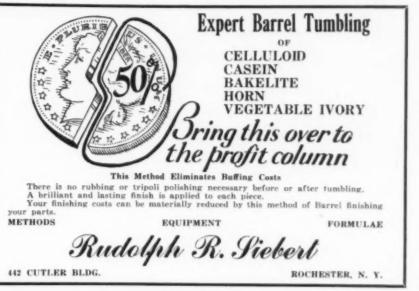
first cost thereof and the amount of labor and time involved in the formation of the required articles therefrom have in many cases prohibited its use for such purposes."

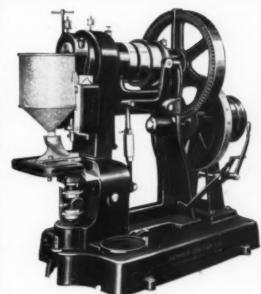
Artificial Horn

The process of patent 460,086 consists in producing an artificial horn comprising laminated

and nested sheets of celluloid, pyroxylin, zylonite, or other somewhat analogous plastic material or materials having partycolored or variegated and lined layers or strata, whereby the characteristic structure and color effect of natural horn are produced.

To be continued in April issue of Plastics





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Casein and Its Industrial Applications.

Edwin Sutermeister. 296 pp. Price \$5.00. Illustrated. 1927.

Eleven authorities, many of them specialists in this field, have contributed to this volume. "Case-in Plastics" is from the pen of Dr. Geo. H. Brother.

The Chemistry of the Natural and Synthetic Resins.

T. Hedley Barry, Alan A. Drummond and R. S. Morrell. 196 pp. Price \$5.50. 1926.

The work of three English chemists, who are recognized authorities on this subject, one of vital interest to the Plastics Industries. Celluloid.

Its raw material, manufacture,

properties and uses.
Dr. Fr. Bockmann. 188 pages.
69 illustrations. \$3.50.
In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them were plastic also reing them more plastic also receive attention.

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. \$8.00.
The book will serve as a guide

and prove a stimulus to the nu-merous investigators and practicioners in the field of artificial resins. The section on plastic molding is an especially valuable feature.

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. \$3.50.

An authoritative work dealing with the materials and manufac-ture of pyroxylin solutions and with their application in the indus-

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Vol. 3

MARCH, 1929

No. 3

Molded Products At The British Industries Fair

By A. C. Blackall

British Correspondent, Molded Products

REAT Britain's most im-Great annual trade exposition, The British Industries Fair, which was held during February and March in London and Birmingham, was in many ways an astonishing spectacle. In the London section there were approximately 1,500 separate exhibitors this year, and the stands alone occupied 516,000 square feet of space. To walk through the eight miles of avenues proved a more fascinating experience than a tour of the shopping streets of London or Paris. Countless articles were shown which have yet to reach the retail establishments, and in most of the sections the opportunity was afforded buyers of contrasting the productions of scores of competing concerns.

The Fair has been held annually for the last 14 years. The London and Birmingham sections are held simultaneously and the exhibits are so classified that the whole of the exhibits in any one trade are together at either London or Birmingham and that it is unnecessary for him to visit both

sections to make a complete survey of a single trade. In the case of molded synthetic resin, casein and cellulose products, however, so multifarious are the applications of these articles to practically all trades and industries that it was found impossible to limit their display to either section of the Fair. Accordingly, they were well represented both in London and Birmingham, some firms-such as Bakelite, Ltd.—having stands at both sections. The London exhibits were confined to the lighter trades and those at Birmingham to the heavier ones.

Large Representation

The London exhibits of molded products were chiefly confined to the chemical hall. Here fifty firms, with a total capital of £100,000,000 (\$5,00,000,000) had exhibits, organized by the Association of British Chemical Manufacturers, showing how closely they follow in the wake of the research chemist, and how quickly they adapt themselves to the needs of the day.

In all there were 11 exhibitors in the chemical section, divided into 44 chemical manufacturers (two less than last year) and 57 manufacturers of druggists' sundries, etc., an increase of five on the 1928 figure. At least 25,000 square feet of space was taken up by this section. In the catalog there were listed 10 exhibitors of electrical fancy goods, 9 of casein and similar articles, six of celluloid and vulcanite articles, 6 of combs, 5 of molded ware, 3 of insulators, 3 of celluloid products and 3 of buttons. The catalog contained 776 pages, including 312 pages of advertising. It was published in three editions, an advance edition of 11,000 with indexes in nine languages, an English edition of 30,000, and a foreign edition of 9,000, with similar indexes to the advanced edition. Invitations were issued to 50,000 overseas buyers and 150,000 home buyers listed on a special index maintained by the Department of Overseas Trade. There was a considerably greater attendance than



Attractive boudoir table sets were featured on the stand of the British Xylonite Co., Ltd. at the London section.

last year and the business done was substantially greater.

The Birmingham exhibit of the big chemical combine, Imperial Chemical Industries, Ltd., was a composite display representing the products of Nobel Chemical Finishes, Ltd., Naylor Brothers, London, Ltd., and the Frederick Crane Chemical Co., Ltd. Some of the latest developments in cellulose finishes for all industrial purposes were shown, cellulose wood finishes, colored furniture enamels, lacquers for wood, and metal and spray enamels, which also included some cracking enamels, providing fine and bizarre effects. Necol plastic wood was another special line. This material is like putty when fresh, but sets solid as wood. The London display of the combine occupied three stands and constituted a veritable museum of all the products of the chemical industry. They were the subject of a very interesting motion picture display which many buyers took the opportunity to view.

A New Composition Product

A new composition product known as Vanalite was shown in Birmingham by the Vitalite Co., Ltd., of London. This product can be used generally for moldings, but it finds appreciation more particularly and on an increasing scale in the electrical trade, on account of its very good insulating properties. It can be made in a great variety of colors, plain and marbled, a feature in this connection being a pure white which is practically undiscolorable.

Novel Articles on View

A product on view for the first time at the Birmingham stand of Buncher & Haselter, Ltd., of Birmingham, was a coffee-shaped teapot, the sides chased with a design following on the lines associated with silverware. The handle and knob were made of bakelite and embodied a molded pattern in slight relief which added much to the appearance of this unusual pot. The metal mountings and hinge were in polished nickel silver.

A complete range of indoor and outdoor condenser type terminals and bushings for transformers and switchgear, including a 132kv. terminal designed

to meet the requirements of the British Central Electricity Board, were to be seen on the Birmingham stand of Micanite & Insulators Co., Ltd., of London. In addition to all forms of micanite insulation, micanite is supplied built up as commutator end rings, stator tubes and slot linings of any cross section, bobbins, and circular, oval or square tubes for apparatus work. Paxolin is the firm's registered trade name for its bakelite varnish-paper insulation supplied in the form of boards, tubes and cylinders. It is especially suited for use under hot oil in transformers and switchgear.

A number of bakelite produc's of particular interest to the electrical engineer were shown on the Birmingham stands of Bakelite, Ltd., London. These included molding and specimens of materials moldings produced, bakelite sheet and silent gear material, and impregnating varnish for insulating purposes. Bakelite products for the higher trades were stressed in the same concern's London exhibit, and applications of various products

were demonstrated. The principal stands of the firm at both Fairs are seen in the accompanying illustrations.

Galatix dressing table requisites, manicure sets, clocks, combs, brushes, etc., in tortoiseshell, ivory and fancy colored effects were prominent in the London Exhibit of Lumos & Co., of London. Galatix is a non-inflammable condensation product now very popular for the manufacture of toilet ware and all kinds of fancy goods. It received the Gold Medal of the recent Dunedin Exhibition.

Molded Stair Rod

A novelty on the stand of the Acetate Products Corporation, Ltd., in London, was the "Celvaloid" composition stairrod. In this age of color the smart housewife must be upto-date, and she can now obtain stair rods to fit in with any scheme of decoration she desires. The wooden rod is entirely covered with a special composition tube which ensures it being not only unbreakable, but also impervious to moisture. The rods can be had in numerous beautiful shades to match practically any carpet, and they are cleaned merely by rubbing with a soft rag. A special polish, however, was featured for obtaining a more brilliant finish.

With regard to glass, the use of safety glass in the form of duplex or triplex cemented

sheets has extended, while new cellulose and other compositions able to transmit more ultra-violet light have come into vogue, and though probably of little value in sunless situations they have therapeutic uses in suitable places. Safety glass also has a huge potential use for automobile windscreens, while other uses include divers' helmets, gauge glasses, goggles. house windows, lamp glasses. porthole lights, signal glass, street lamps, street-car windows, mirrors, locomotive cut glass and compass glass. The new Splintex non-discolorable safety glass was shown on the London stand of Splintex Safety Glass, Ltd., London. In addition to being shatterproof and unsplinterable, splintex is also guaranteed permanently nondiscolorable. It is being produced at a price competitive with the various other safety glasses at present on the market.

Dexine, dexonite, and asbedex were composition products featured in London by Dexine, Ltd., of London. As is well-known, dexine is a composition of vulcanized rubber and other ingredients, the resulting material being of a tough and frictionless nature capable of withstanding extreme temperature and impervious to the deleterious action of acids, gases, ammonia, oils and greases. Its

adaptability is claimed to render it practicable to produce any article which has hitherto been made of ordinary rubber. Dexonite is a superior rubber product is acid and alkali-proof and not brittle. It is a perfect insulator and resists high voltages. Asbedex is a composition of compressed asbestos fiber recommended for any stream pressure.

Solidite

Another interesting London stand was that of Solidite & Synthetic Moldings, Ltd., London, the chief novelty here being a handsome cigarette cabinet of new and ingenious design. This cabinet consists of an inner nest (which contains the cigarettes), pivoted in the center of the outer casing, so that by merely pressing one end of the front panel, the whole of the nest revolves and exposes the cigarette container and match stand. Two distinct types of moldings are made by this firm-bakelite and solidite. The latter is the firms own specialty and has been worked up from its formula to a high degree of excellence. This material is suitable for the larger type of molding, where utility and economic production While it has not come first. the fine finish of bakelite, it is particularly suitable for such articles as conduit junction and meter terminal boxes. panels. A molding of rather un-



The stand of Bakelite Ltd. at the Birmingham section of the British Industries Fair.

usual qualities is seen in the solidite fireproof moldings, in which a cold plastic material is forced into a mold, partly dried out and remolded. The finished part is sprayed black, which imparts a nice appearance to a component possessing great strength and toughness combined with absolute non-inflammability, such parts are most suitable for electric heating appliances or where the provision of good insulation under high temperature is called for.

Celastoid, the new safety celluloid sponsored by the British Celanese, Ltd., London, was shown in automobile weather shields of several types. Celastoid is claimed to ensure perfect safety from fire and constant clarity, to be odorless, undiscolorable, and unbreakable. Complete sets of screens range in price from £4 (\$20) for 4 screens for a 2-seater, to £8

15s. (\$43.75) for 8 screens for a 4-seater and over. Celastoid is easily manipulated. Forming and pressing into various shapes can be done while the temperature of the Celastoid is at about 50° to 60° C. This temperature can be obtained by gas, steam. or electric heated tools combined with previously heated Celastoid by dry or steam heat. Soaking in heated water has been successfully used, but dry and steam heat is preferable. Articles such as bag frames, cigarette tubes, etc., can be molded in suitable molds if the material is got into a semi-plastic state by heat. In this case, of course, the temperature has to be raised considerably.

Beautiful bulbs deserve beautiful bowls to set them off in the opinion of Birkbys, Ltd., Liversedge, and at their London stand this year they introduced a handsome line of Elo ware

bulb bowls that rival the finest pottery yet are practically unbreakable. These bowls are unaffected by liquids and have a variety of color design almost without limit. Circular and octagonal bowls and pots were shown in great variety, the range of variegated articles including fifteen combinations of colors comprising black, brown, green, red, yellow, and blue. Elo is the registered trade name of a synthetic resin material originally evolved for the manufacture of electrical insulation in the form of moldings, molding powders, varnish and resin. Its general properties are: - specific gravity, 1.33 to 2.0; di-electric strength, 30/40,000 volts a. c. on 1/8-inch thickness; tensile strength, 4,000-5,000 lbs. per square inch; unaffected by temperatures up to 400° F.; has no softening point; unaffected by water, weather, oils, acid, fumes, alkalies, ordinary solvents, live stream, etc.; unaffected by surface condensation: chemically inert; does not support combustion; not brittle; extreme accuracy in molding; contains nothing harmful or deleterious to metal parts; and can be supplied in various colors.

So satisfied were many exhibitors with the results of the Fair that they booked their stands for next year's show during the run of this year's event.

Sheffield Tries New Hafting Material

WORLD-FAMOUS manufacturing cutlery concerns of Sheffield, England, are now giving an exhaustive trial to a new hafting material as a substitute for celluloid in the production of the cheaper qualities of cutlery. The chief advantages claimed for the new composition product are that it is non-inflammable and that it does not shrink even through contact with moisture. No details of the new material are yet available, but should it emerge successful from its trials it will doubtless be put to manifold uses by the Sheffield cutlery industry.

New Molded Desk Set



THE "Desk Executive" is the latest in desk pen sets. It has a handsome, molded base of either Black or Mahogany Durez, on which is mounted an eight day, twelve jewel movement New Haven Clock in a molded case to match the set.

The pen socket swivels are of highly polished brass and support the molded black receptacles, these carrying two automatic Corona fountain pens.

Another feature of the set is the permanent calendar pad, protected by a transparent cover.

The set measures at the base 7½x13½. It is a product of the Norton Laboratories at Lockport, New York.

Some New Uses For Synthetic Resins

B ELOW: Bakelite laminated material is utilized for window sills in Pullman cars on the Union Pacific Railroad. A new and commendable trend in interior decoration would seem to be indicated by this use.



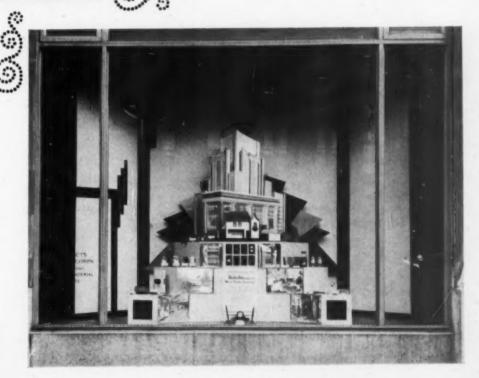




A BOVE: Free action is provided in this ingenious arrangement of a rubber stamp and stamp mounting developed by the Lake Manufacturing Company of Dallas, Texas.

A resinoid molded base is joined by a section of rubber secured to a wooden handle, thus providing play between the base and the handle which will not disturb the impression made when stamping. The rubber is held firmly in place by resinoid cement, another form of Bakelite material.

R ESINOIDS Step Into Modern Building Construction is the title of this modernistic display recently featured at the Architects' Building, Park Avenue, New York. The setting interestingly depicts the transitional steps by which phenol resinoid material is created in the laboratory and subsequently evolves as a material useful in the construction of homes and public buildings. Modern art in window trimming uses Bakelite materials as evidenced by the display background.



Casein Assuming Important Position in U. S. Trade

Domestic Production On Upward Trend

By J. N. Taylor
Chemical Division, Department of Commerce



These attractive silver cups are provided with casein stems made by Karolith Corp.

NITED STATES production as well as imports of casein have more than doubled within the last decade. Over 18,000,000 pounds were produced in the United States in 1927, as compared with 8,000,000 in Imports during 1927 amounted to more than 24,000,-000 pounds and increased to more than 28,000,000 in 1928, in comparison with 12,000,000 pounds in the 1918 fiscal year. To-day, casein is the fourth largest chemical raw material imported into the United States.

A Product of Many Uses—Made from Skimmed Milk

Casein (lactarene) is, chemically, a protein found in milk in the form of calcium caseinate, and, consequently, is capable of preparation in any part of the world where the milk of mammals is obtainable. A form of casein is now produced in Japan from the soy bean. Casein is used in the paper, printing, lithographing, electrotyping, and publishing industries, and as an adhesive in the manufacture of plywood veneer prod-

ucts, such as chests, desks, and doors. During the World War, as a waterproof adhesive of great strength, its use was developed in making airplane propellers. A special grade of hardened casein, known under various trade names, is used in making a wide variety of articles such as buttons, combs, umbrella handles, brush backs, and cigarette holders. Casein is also employed as an ingredient of spraying insecticides and waterproof paints and as a diabetic food, as well as in the manufacture of wall paper.

For the manufacture of casein, the chief raw material used
is skimmed milk, which contains beside casein, albumen,
milk sugar, and certain salts.
Precipitation of the casein is
accomplished in one of four different ways: (1) The natural
method, allowing the milk to
sour until the casein is thrown
down; (2) by lactic acid; (3)
curding by the addition of a
mineral acid; and (4) through
rennet precipitation. The curd
is then washed with water,
pressed, dried, and ground.

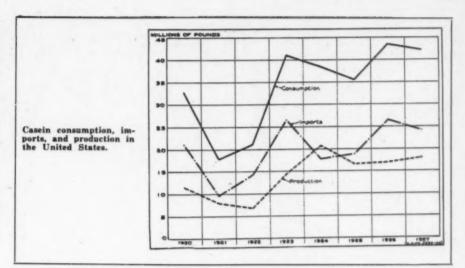
Consumption Curve Rises— Relation to Production

The accompanying graphic representation visualizes the relationship during the calendar years 1920 to 1927, inclusive, between the two factors of consumption—the aggregate of domestic production and imports.

According to data compiled by the Division of Dairy and Poultry Products of the Bureau Agricultural Economics, United States Department of Agriculture, production of casein in the United States decreased from 14,000,000 pounds in 1919 to 7,000,000 in 1922, and the proportion of total consumption supplied by domestic producers declined. The domestic output subsequently increased, reaching the highest 20,759,000 pounds in point. in 1927 Production amounted to 18,033,000 pounds.

Production Widely Distributed

The States of New York, Wisconsin, California, and Vermont collectively supplied 84 per cent of the total output in 1927, while Minnesota, Idaho, Illinois, Maine, Michigan, Pennsylvania, and Massachusetts together



provided 15 per cent. Although New York is, according to the latest available figures, the leader in casein production, its proportionate increase since 1920 is not as great as for Wisconsin or Vermont, while the Californian output fluctuates. Two-thirds of the production is obtained during the spring and summer.

Imports Show Gain in 1928

Imports of casein entered for consumption in 1928, according to preliminary figures, amounted to 27,450,000 pounds, valued at \$3,600,000, registering an increase of 10 per cent in quantity and 16 per cent in value over 1927 receipts of 24,260,000 pounds, invoiced at slightly over \$3,117,000. Data for imports, by countries, appear in the accompanying table.

Argentina Continues as Leading Source

Before the World War, France supplied the larger portion of the imports of casein into the United States, but during the war Argentina assumed first place and from 1921 to 1924, inclusive, furnished over 90 per cent of the total receipts. Ar-

gentina continues to lead and contributed 86 per cent in 1928. Shipments from Germany took second rank and France occupied third position. Receipts from the Netherlands, Australia, and New Zealand in the first half of 1928 increased, exceeding the entire 1927 shipments from those countries to America. During the first six months of 1928 consignments from Belgium ceased as did also those from Denmark, Finland, Italy, Latvia, Norway, and British India. A big drop was registered in imports into the United States originating in the United Kingdom. These reductions are the more significant considering that in 1927 there were exported from Belgium to the United States, 44,335 pounds of casein; from the United Kingdom, 222,706 pounds; and from British India, 30,825.

Protective Tariff Asked on Manufactured Casein Plastics

CASEIN plastics manufacturers have started a movement for increasing the tariff on manufactured casein articles. Due to cheap labor available in Europe in this field, European casein plastic manufacturers can undersell Americans in American markets. It is claimed that for work that is performed in Europe for \$18 per week, American manufacturers must pay \$1.50 per hour.

American manufacturers have therefore asked for a protective tariff of 40% ad valorem or in American valuation 40 cents per lb. on finished casein products.

General imports of casein, or lactarene into the United States, by countries

	1926	1927			19281	
Pounds	Value	Pounds	Value	Pounds	Value	
245	854	44,335	\$6,669		*******	
68,309	8,416	775	121			
2,103,263	243,544	2,668,973	381,788	608,175	\$87,618	
127,616	21,900	1,146,971	165,752	940,752	135,384	
		46,294	7,063	127,558	18,059	
233,684	31,821	222,706	32,312	556	89	
157,508	14,824	284,466	34,523	140,867	19,279	
23,521,722	2,521,358	19,589,813	2,460,564	13,673,506	1,790,868	
578	- 68	4,480	642	13,440	1,929	
65,726	9,233	169,646	27,206	198,464	29,210	
2,475	324	31,045	3,028			
26,281,126	2,851,537	24,209,504	3,119,668	15,708,558	2,082,486	
				¹ Subject to	correction.	
	245 68,309 2,103,263 127,616 	Pounds 245 354 854 854 854 824 924 924 924 924 924 924 924 924 924 9	Pounds 245 854 44,385 775 84,399 8,416 775 2,103,263 243,544 2,668,973 127,616 21,900 1,146,971 46,294 233,684 31,821 222,706 125,520 24,526 23,521,722 2,521,358 19,589,813 578 63 4,480 65,726 9,233 169,646 2,475 324 31,045	Pounds Value Pounds Value 245 \$54 44,335 \$6,669 68,309 8,416 775 121 2,103,263 243,544 2,668,973 381,788 127,616 21,900 1,146,971 165,752 46,294 7,063 233,684 31,821 222,706 32,312 157,508 14,824 284,466 34,523 23,521,722 2,521,368 19,589,813 2,460,564 578 63 4,480 642 65,726 9,233 169,646 27,206 2,475 324 31,045 3,028	Pounds Value Pounds Value Pounds 8,416 775 121 2,103,263 243,544 2,668,973 381,788 608,175 127,616 21,900 1,146,971 165,752 940,752 233,684 31,821 222,796 32,312 556 157,508 14,824 284,466 34,523 140,867 23,521,722 2,521,358 19,589,813 2,460,564 13,673,506 578 63 4,480 642 13,440 652 2,475 324 31,045 3,028	



Lamp shade made of Bakelite laminated

Plastic Lamp Shades a New Triumph of The Industry

Cellulose, Casein and Resinoid Lamp Shade

WITH the widespread interest in illumination of house interiors has come a greater demand for variety in color, style and material for lamp shades. The plastics industry has been quick to sense this new interest and has developed a large choice of lamp shade materials. We are showing here three representative instances of plastic lamp shades. These include a laminated resinoid, a casein and a cellulose lamp shade. All three are trans-

lucent and can be manufactured in solid colors or various color combinations.

These lamp shades must meet what Mr. Reeves, Vice President of the Celluloid Corp. has called the new competition; the competition between industries. If the plastic industry is to get its proper share of the ultimate consumers expenditures it must furnish something new.

"To be specific, let's look at lamps, particularly lamp shades. Mrs. Consumer has saved a few dollars to liven up the living room. Nowhere will the decorating-dollar go so far as in new lamps. She is interested in lamps—has seen the difference a new lamp made in her friend's home. She is definitely in the market for a good lamp—a new fashionable lamp—for a reasonable price."

The plastic lamp shades respond to this new demand. The product of the Celluloid Corporation is a handsome non-inflammable shade that will not

break nor warp and can be washed with soap and water. It is furnished in a large number of designs, The material may be bought in any combination ready to mount on the lampshade frame.

The lamp shade of laminated Bakelite is supplied by the Spaulding Fibre Company.

The frame and supporting members of the lamp shade are of metal construction, but the six decorative panels are made of Bakelite material of the laminated type. The decorative sections are made by impregnating curtain stock fabric with Bakelite resinoid solution. The impregnated fabric is subsequently subjected to a pressing operation to give it rigidity and surface gloss.

Another lamp shade shown here is made of casein. This is a very interesting example of casein molding. The depth and



Above: Casein lamp shade made by Karolith Corp.

Left: Lumarith lamp shade made by Celluloid Corp.

finish of the molded piece is evidence of fine workmanship in this difficult medium. Though the molding of casein is comparatively a new art, it has already been successfully applied to a large number of articles that are enhanced by the bright and lasting colors which can be secured in this new molding material.

Molders Association to Hold Meeting

THE Molded Insulation section of the National Electrical Manufacturers Association is to hold a meeting at the Westinghouse Plant in East Pittsburgh on March 29. At the meeting the final choice of a generic name for molded products will be made. The meeting will also consider standardizing trade practices among molders. All interested parties are invited.

Why 13 Pages of Advertising Are Not So Good As 26

By a Chicago Advertising Agent*

URING the last year I have Deard or participated in a dozen discussions about the alleged intangibility of advertising. Six or more people have propounded to me the following question either in these words or with this basic idea: "Since advertising is largely intangible, isn't it a fact that thirteen pages in a national magazine would do just about as well as twenty-six; or that six pages in such a publication would have substantially as much selling effect as thirteen?"

One of these conferences of which I speak was held in the presence of a celebrated engineer, and he, too, advanced the same general question. I imagine that, on account of his habits of thought, he had the answer all the time; but presumably he wanted to see how nearly exact the assembled group of advertising men were in their thinking, how closely they could come to scientific procedure in their merchandising work

"Won't thirteen pages do as well in this magazine (naming it) as twenty-six," he inquired, "in as much as a lot of the effect of advertising is impression? Isn't it a fact that few dealers or few salesmen could really tell whether you were using thirteen or twenty-six pages in advertising a commodity or a line of merchandise in which they were interested?"

If a person assumes that advertising is done for its impression on dealers as advertising—and not for its results—or that advertising results are imaginary, these questions are more or less in order.

But if he thinks about advertising as it actually is, and

takes sufficient cognizance of thousands of stores and manufacturing organizations that actually know just how much in the way of results they get from their advertising, such queries do not present much of a problem.

The Mathematics of Advertising

I had the foregoing in mind when I answered the engineer. And here is what I told him:

"Advertising is power. It is no more intangible than electricity. You may not be able exactly to define all the manifestations of electricity but no one would doubt its power. The degree and quality of the power of advertising is the result of mathematical multiplication."

This was something of which I had been thinking for years. And, even before I had thought it through sufficiently to put it into words, I believe I long had been influenced by the idea, at least subconsciously. On checking back over my career as an advertising agent I can see many instances where I proceeded with confidence and gained good results whereas, if I had looked upon advertising in less definite terms, I might not have had the courage to proceed at all.

The result of all this experience, which time and again has brought definite and unquestioned proof that advertising really is power, has caused me to believe (which I here assert) that it can be expressed mathematically. Under certain definite conditions it can be expected to produce certain definite results, and the results can be computed accurately.

Out of this line of reasoning I finally evolved for myself a mathematical formula in which

advertising can be stated so that its actual meaning-what it really does -can be accepted with the same finality that is the case with any other properly stated mathematical formula, If certain numbers are brought into any one or several mathematical relationships with other numbers, the result is not in doubt; it is definitely provable and as such is to be accepted without argument or qualification. Advertising can be defined and considered in the same terms.

Here, then, is my formula: Advertising is space multiplied by frequency, multiplied by circulation, and either multiplied by, or added to, copy quality.

This, in part, is really an amplification of Benjamin Jefferson's milline principle, the first announcement of which was given to the world by Printers' Ink on September 9, 1920. In an article appearing in Printers' Ink of that date the word "milline" was brought forward as a definition for the product of space multiplied by circulation.

"The development of the milline," Mr. Jefferson said, "is that theoretically firms should base their advertising for upon so many millines of advertising for months. It makes no difference under this system whether you spend your money in fifty mediums or in one medium; the publicity weight is accurately gauged by the total Here is one publicamilline. tion which looks just like another but is actually getting six times as much for its advertising space. Here is one daily paper which looks just the

(Please turn to page 172)

*Reprinted from Printers Ink

Notes On a Journey Through The Molding World

What Western Moulders Are Doing As Seen

By R. C. Gilmore, Ir.

Philadelphia—February 19th

Mr. Novotny of Stokes and Smith ("Durite"), was out of town on one of his frequent sales trips through the middle west. Mr. Stokes was also away, so we made all contacts through their agency since, on a previous visit, we made a fairly complete tour of their well organized plant, and ate an excellent dinner in their restaurant. We were much more fortunate at the F. J. Stokes Machine Company, however, for we not only were able to transact business -although Mr. Stokes was away on a vacation in Yucatan or some such distant land-but we got our initial view of the new outside office-new to us at any rate. It is attractively done in unfinished wood, and the main reception room is decorated with colored photographs of various pieces of machinery in operation. This room is about 80 feet long, and the different executive offices as well as the plant itself are all entered from it. One admires the choice of daylight lighting through large windows rather than the use of electricity, for it gives an added effect to the pictures as well as to the entire reception room.

We went back into the city from F. J. Stokes in time to transact other business which is more or less inherent upon any publisher, and which we will, for obvious reasons, omit entirely. Then, having stopped off to view the progress of Kemikal, Inc., a newcomer to the field of experimental molding, we took a sleeper to Cleveland, Ohio, on more publishing business that would be uninteresting to our readers. Leaving Cleveland on Wednesday the 29th, at noon, we went to-

Elyria, Ohio

Where we made a complete tour of the molding department of General Industries with Mr. P. R. Siegfried, whom we met some time ago in Dayton at the molders meeting. Not only do General Industries, or Inter-national Insulator (their correct mold name), make their own dies and maintain a separate department for their design, but they also are able, through their phonograph-motor



Keeping up with the molders and the trains was one of the great problems of our trip.

department, to furnish all the inserts that their customers need. Fully 90% of their entire output, so Mr. Siegfried stated, is for the automobile industry, although gear shift balls for washing machines and other appliances seem to be a good source of income. control of insert supply not only precludes the sketchy and unsatisfactory buying of their customers, but it enables them to keep operating costs on a singularly low level and complete the entire manufacture under one roof. The plant is well manned, excellently lighted and quite efficient throughout, but we believe that there is a

need for more elbow room around some of the presses both for ease in operation and adjustment. Needless to say the plant is working to capacity as are most of the others that we visited on our trip.

Detroit, Mich., Feb. 21st.

Mr. Addison of Arthur Colton Inc. took us through their plant, showing us the preforming presses as well as some of their other lines. We were very much interested in a room full of machinery turning out gelatine capsules, and although it is an automatic operation, there were several men on hand-one of whom was Mr. Colton himself, dressed in working clothes and helping in the operation of a machine. The firm of Arthur Colton has long been identified as a leader in the field of pharmaceutical machinery and was established in the 80's. More recently they bought out an attractive line of preforming presses for the plastic industry, and-well let their advertisement tell its own story! We understand from Mr. Keen of Metalwood Manufacturing Company that they are no longer bending their energies toward Hydraulic presses for molding work. Metalwood was a friend of Plastics way back in 1926, and we are sorry to hear that they have discontinued their

Jackson, Mich., Feb. 21st

We quite unknowingly went to Jackson on the same train with Mr. Rossiter and Mr. Goodrich of Reynolds Spring, who were returning from a sales trip, but had an interesting and productive talk with Mr. Goodrich at the plant, though the stock of untouched mail on his



Where a doubly friendly greeting can always be relied upon.

desk prohibited a long visit. Both of them had been away all week. Needless to say, they are busy, not only with their own electric work, but with the type of custom molding that distinguishes their output. We did learn that H. J. Grigoleit, manufacturers of Hydraulic Presses, who were formerly located in Jackson, have moved to Peoria, home of the recent 17 liquor poisonings!

Chicago, Ill., Feb. 21st-28th

Spent a whole week in Chicago, City of racketts, owing to the three day holiday caused by Washington's birthday. After doing personal business at our office, 77 Washington Street, we went to see how Schneider Bros. are coming with their moving. Both Art Schneider and his brother were in the new offices, and we understand they will be completely transferred in a few This will give them much more room as well as additional light and air, and we postponed a plant tour until our next trip so that we can be more agreeably surprised and were content to sit and talk about business, Nema, and other interests. It is easy to see why the Western molders get along better: in the first place they co-operate by getting together every three or four weeks to discuss business matters; in the second place they are content with a reasonable profit, and they take work at a profit; in the third place they are fewer and further between. We believe the keynote of their pres-

ent standing is co-operation, a thing we have constantly preached, for they joined hands long before Nema sought to join them, and Nema has only served to increase their get-together spirit and consequently their profits as well. Nema seems to have done this outthere, and we believe that it can do it here also. None of us are too old to learn, anyway, especially with nothing to lose and everything to gain!

Belden Manufacturing Company, who are also moving, but way off to Richmond, Indiana, seem to be continually overworked. We had a fine reception from Mr. Stratton, and a good, but brief talk with the Vice President Mr. Van Norman, who was formerly with Belden, has been connected with Imperial molded for just a year. This latter company, by the way, is in much the same position as International Insulator in Elyria, since it controls the supply of inserts through its main company, Imperial Brass. We had a good visit with Van Norman and missed Mr. Amrine, who seems to be continually on the run, so we postponed plant inspection for a future visit." We did, however, make a complete tour of Chicago Molded Products with Mr. Kelly,

who has completely recovered from the effects of the automobile accident he had returning from the last Nema meeting (so has everyone else who was in the car, including Art Schneider). Kelly has spent the better part of four years laying the foundation for the new plant, and it has been time well spent. Not only are the entire three stories kept immaculately clean at his order, but even the press room is a surprise because of its floor drainage system.

We must admit that this plant is evidently not working to capacity, but it is still young. The tool room is designed to give efficient, easy operation, with an individual swinging electric light on every machine and plenty of room between operators. Every tool is in its place (there is even a fireproof vault for the customers molds) and every man in on the job, supplied with an all-metal work bench and a tan duster to wear About 24 over his clothes. presses are at work in the press room, most of them raised on a cement block, and laid out in rows of four with all steampipes running under ground. We were impressed with the variety of articles being molded (Please turn to page 168)



Some nocturnal wanderings in quest of our friends. We arrived at 4:30 A. M. to do business in Terre Haute.

SCRANTON



MOLDED PARTS NEVER FAIL · · ·

Because -

They are made in molds of the utmost precision

And -

Made of the finest molding materials



The Scranton Button Co.

Offices:

Chicago, Ill. 645 Washington Blvd.

Cleveland, Ohio 4900 Euclid Bldg. Detroit, Mich. 114 E. Lawn Avenue

New York City 50 Union Square Scranton, Pa. 419 Cherry St.

Auburn, N. Y. 40 Washington St.

Factories:

Main Plant

Scranton, Pa.

Branch Factories

Auburn, N. Y.

Framingham, Mass.

and with the entire method of plant maintenance. The men have lockers and a shower and everything is done to make work easy. The plant is not large, but it would be an eye opener to a lot of molders we know whose overhead is costing real money! We wish we had time to go into more detail about the lighting, heating, press room, finishing department and especially the tool room, but we have'nt. We do suggest that any of our friends in the molding business take the time to inspect this plant at the first opportunity for it is one of the neatest establishments on a medium scale that we have ever seen.

We saw C. W. Helferich of Real Equity for a few minutes, but did not inspect, saving that also for the future. Neither did we visit the molding department of Kellogg Switchboard, though we had an interesting and fertile visit with Mac-Harlan, the advertising manager. Certainly if their entire plant is like the small illustration in their advertisements, we have an agreeable surpise comming. We must admit that we were very well received everywhere, although either through a peculiar coincidence or deliberate disconnection we were twice cut off in the middle of a phone talk with a second-hand



We are greeted sometimes with a smile sometimes otherwise. Mr. A. of Chicago was too busy.

machinery dealer. We have too many friends to let that worry us, however, though we doubt that he treats all his business connections that way— Mr. W. K. K. Smith of Elmes Engineer-

ing Works, an old friend of Plastics, gave us a fine reception in spite of the fact he was in the middle of Income Tax reports, and introduced us to a group of Chicago publishers—the International Trade Press. Some day we hope to find Mr. Smith with enough time on his hands to show us "the works" that are so well known to users of Hydraulic Machinery.

From Chicago we took in Cutler Hammer in Milwaukee on advertising-though we will report on their plant operation the next time, and rode out with the former editor of Molded Products, J. Maguire, and the Fiberloid representative. Maguire is now handling Chicago for Catalin. We also talked by phone with Phenolic Products Corporation in Rockford, Illinois, who are upset by moving, reorganization or some such unpleasant necessity. Then after transacting other personal matters, and having postponed a visit to Fibrose Insulation in Valparaiso, and some others in Chicago, we left for-

St. Louis, Mo., March 1st. where we had an interesting and pleasant visit with Lynn A. Watt and R. E. Sturhahn of Monsanto Chemical Works, but missed H. O. Parker, who had called on us in New York. Monsanto has adopted the "make haste slowly" attitude, which should prove very valuable in their chosen field of plasticizers and solvents, as well as in some rumored new development. We missed Mr. Stone and Mr. Veatch of Flexo Supply Company (who supply a lot of the molders with swing joints) and had an interesting talk with Mr. Evans of Diamond Metal Products, which we will be able to give more fully in the future.

Terre Haute, Indiana, March 2. Where we arrived at 4.30 A. M.—and had to get off! We saw one of the most efficient plants we have ever had the pleasure of visiting at the Commercial Solvents Corporation. Dr. Dillingham took us through, explaining to our layman's mind, the entire process from corn to solvents (such as Butanol) and



Business agreeably transacted.

beyond. It is a large plant, perfectly spotless and sanitary as it must be, and almost entirely automatic in operation. About three-fourths of the fifty-six 40,000 gallon fermenters were in operation-and this is the final fermentation! A very complete tour, and we thank Dr. Dillingham for his time, as well as Mr. Orr who suggested it. If any of the molders are interested in simplified process of waste utilization, we recommend this plant-even at the 4.30 a. m. rising hour we had to suffer!

Cincinnati, Ohio, March 3rd

We spent an hour and a half on Sunday with Mr. Backscheider of Recto Manufacturing. This concern is doing some nice molding, and, although young, compared to some of its competitors, has made a comfortable inroad on western business and has adopted some policies that are indeed revolutionary. Plenty of the molders predicted its downfall some time ago—now we are confident enough to predict its success.

We seem to be doing a lot of business on Sunday! We did! And we also had the most pleasant experience on our trip—Sunday afternoon and supper with Chris Kurz, Henry Kasch, and Joe Bauman, the western representative, at Mr. Kurz' house outside town. We not only discussed molding and future outlets, but we learned the story of the founding of the present Kurz-Kasch Company

Dayton, Ohio, March 3rd

written by Mr. Kasch himself, (Please turn to page 170)

-a story that deserves to be

A dependable, permanent source of supply



In these mighty workshops of General Electric, millions of pieces of Textolite molded have been produced. And production to-day is greater than ever before.

Here is a supply available for decades; a responsible, comprehensive organization; a reliable source of highest-grade materials. These plants are backed by the great resources of General Electric; by the famed research laboratories; and by unexcelled facilities for service.

For complete satisfaction in the use of custom-molded parts, specify G-E Textolite molded.



Textolite Molded

885-15

GENERAL ELECTRIC

When writing General Electric Company, please mention Plastics

KURZ-KASCH

PLASTIC MOULDING HEADQUARTERS

Where the finest moulding traditions are created . . .

Manufacturers of widely varied moulding needs have found Moulding Headquarters their safe confidant in particularly exacting situations. Not only have we been able to create new traditions of workmanship, but we have consistently turned out the most intricate castings without disturbing our plant routine. Get in touch with Moulding Headquarters for quotations.

The reputation of Kurz-Kasch moulding has been established by the unflagging zeal of our organization for the finest results. The finest materials, equipment, and facilities are available, as well as ideal working conditions.

The Kurz-Kasch Co.

DAYTON, OHIO

Molders of Plastics

Notes on the Molding World

(Continued from page 168)

and that will appear in an early issue of *Plastics*. This is the second time that we have recently enjoyed Mr. Kurz' hospitality, and the molders are more than fortunate to have such a man for the president of their Association—a man who has the interests of the whole industry at heart. Those of us who have never seen the large Kurz-Kasch Plant might welcome a brief description.

There are five main buildings, in addition to a cafeteria, arranged in rectangular form. The main office, two stories in height, is 60x30 feet, and contains, on the ground floor, the executive and administration offices, and additional rooms for sales meetings on the second story. The tool room, which is equipped throughout with modern machinery, is 60x120 feet, and there is also additional space for designing and storage. Eighty presses are in the press room, which is also 60x120, and an additional 3600 square feet have recently been added to the finishing department, which formerly occupied a space 60x200 feet. In spite of the large size of the different buildings the lighting arrangements are more than adequate and the recent addition to the finishing department gives additional aisle space. We inspected the plant Sunday night, when everything but the tool room was shut down, and were able to get a much more comprehensive survey of the extent of operations than we did on our previous visit some months ago, even operating a small machine and going over in detail the advantages of Beetle. As for the latter, we had the satisfaction of hurling a thin beetle glass against a radiator and finding it uncracked afterwards. Kurz seems to have recovered from the flu, but Mr. Kasch doesn't look as well as he did

on our previous visit. Joe Bauman looks as well as usual in spite of his many operations.

Piqua, Ohio, March 4th

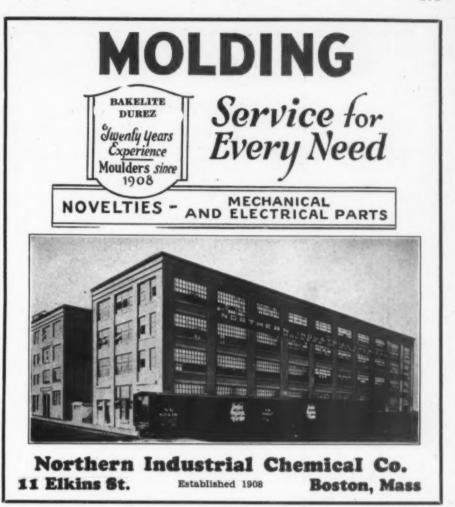
And a short visit with French Oil Mill Machinery on March 4th, but a long visit in Piqua necessitated by bad train service. Mr. Stacey has a new catalog, by the way, that gives the complete line of their well designed presses—a catalog well worth writing for.

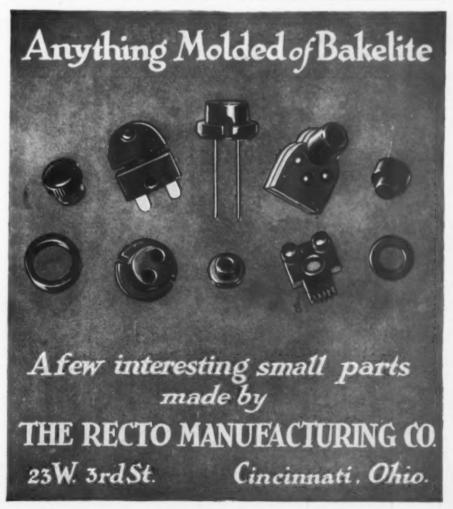
Mount Gilead, Ohio, March 5th

We encountered more bad train service in going to see Mr. Lawyer and Mr. MacMillin of Hydraulic Press Manufacturing Company, the largest machinery plant we encountered, and the only large plant in Mt. Gilead. We suggest that they run special automobiles for visitors to and from the station at Edison-not only to save taxi fare, but because most other plants do it for the convenience of their partons. When we visit Stokes & Smith in Philadelphia, for instance, we call up Mr. Novotny and save an hour of our time by riding out in a company car. Hydraulic Press are issuing a monthly house-organ and a brand new descriptive catalog. Both should prove of value to the buyer.

Pittsburgh, March 6th

We had our first inside view of the Westinghouse works in East Pittsburgh and a fine conference with Mr. Eakin of the advertising department. Kempton was busy in the patent office and we refused to interupt him, since we only wanted a social talk and expect to see him in the near future. Westinghouse is erecting a new plant for Micarta, which, when completed, will cost upwards of \$3,000,000 and is now about one third finished. We were so interested in details of this project and others equally startling that we did not get back to Pittsburgh until 1 p. m. Mr. Stevenson of Insulation Products was so busy he could not even take a minute with us. This is an excellent reason—it goes with us everytime, for nobody wishes business for the molders more than we do. How-





PLASTIGS

For Every Need

HARD RUBBER GOODS

Moulders since 1897

Our experience insures High Grade Economical Production

WE SOLICIT YOUR INQUIRY



When writing these advertisers please mention Plastics

ever it is entirely unnecessary for us to see anyone—unless we wish to talk advertising, which we forget to do nine times out of ten. Give us the key to the press and tool rooms and we will amuse ourselves for hours analizing the extent and efficiency of operation!

And so back to the office after a thoroughly enjoyable and profitable trip. The western molders are well organized into a unit for profit extension, and they are only beginning to see the advantages of co-operation. We learned this as much from the plant interiors as the quantity of work. The Eastern Molders are not this way, they are losing money by not investigat-We have mentioned the solution time and again; we have discussed from a purely academic standpoint, the advisability of such co-operation; we have tried to show the merits and the drawbacks of an Association and especially of the Molders Association and how the merits can be capitalized and the drawbacks eliminated. We are always glad to discuss this with any of the molders for we can get as much, or more help from them than they can from us, and though the time for discussion is almost gone, we still welcome any opportunity for exchange of thought. All we need is a letter.

Advertising

(Continued from page 164)

same as another daily paper but yet is assessing its space at four times the price charged by competitors. But under the milline system the rate is not considered in connection with the circulation of a publication but in the cost of one line in 1,000,000 copies of that paper."

A compartive study of my formula and the milline will show that I have logically developed that system by adding to it the vital item of copy quality. And thus, I believe, the advertising formula is now finally complete and can be stated in mathematical terms.

Copy's Part in the Formula

Copy, as a strange matter of fact, is not always given its rightful place as one of the most important parts of the formula. It would be ridiculous to say that, merely having space, circulation and frequency, we had the full power of advertising. This could not be for the simple reason that the entire power of advertising is determined by the suitability of the copy, the originality of it, crusading tactics of it and finally its salesmanship.

(In my own mind, to speak parenthetically, I really think of advertising in terms of substance. To me, advertising has dimensions. To the mind that is thinking about it only occasionally, or not thinking the case all the way through, this may seem a radical definition. It doubtless is true that most people think of advertising as having numbers, length and breadth, or length and height to a large flat surface with no thickness. To me, advertising has cubical content and I get that cubical content by multiplying space times frequency, times circulation. Also, to me, the quality of this cubical content is determined by the copy -whether it is good, fairly good, or bad.)

Those who have doubts and fears about advertising, or who make queries as to whether thirteen pages are not as good as twenty-six and so on, would do well to thing of some of advertising's actualities.

There is, for example, no problem about the results of advertising in retail institutions such as the Hudson Store, in Detroit, or in the Boston Store in Milwaukee. These stores keep scientific records. They know what different advertisements on different days in different papers produce in different departments and on different items.

They think of their advertising, therefore, as being just as definite a force as the light that comes in over their electric wires and illuminates their



Years of EXPERIMENTING

crowned with Success ...

A T first the toy of scientists, then a decorative oddity. Today a product more useful than cast or stamped metal—that is the story of NORLOC through a score of years. Constant experimenting has developed NORLOC to its present high point of usefulness in industry.

NORLOC cuts costs—enhances the beauty of manufactured products—releases capital formerly tied up in large stocks and labor for the more useful purpose of building sales. It standardizes your product in color, in form, in hardness, so that it is impossible to distinguish between the first or millionth in the line of production.

You can advantageously use NORLOC! Mail the coupon as the first step toward the investigation of this economical adjunct to industry.

Norton Laboratories Co.

Lockport, N. Y.

Norloc

THE
TRADE
MARK
OF
QUALITY

Norton Laboratories Co., Lockport, N. Y.

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E. W. Wiggins & Co., Inc
R. D. Wood & Co

Say you saw it in PLASTICS

buildings, or the heat that comes from the vapor in their radiators and heats their buildings. They do not question that the heat is there because it is in the form of invisible steam. They do not question that the current is being supplied by the central power stations; but they have it measured, they believe in it, and they pay for it. They do not refuse to buy it because some phases of its manufacture or application are not understood.

The delver into advertising who really wants to know what it is, must go to the source of the tangible and traced results, measured results in terms of hourly, daily, weekly, or annual sales. Probably the best place to get understandable evidence of tangible results in advertising is in the classified sections of certain metropolitan daily newspapers.

Not all newspapers feature

their classified sections. But there are usually one or two newspapers in every city of size that produce an extraordinary number of traced results for thousands of people each year. One newspaper is reported to have handled in one year 4,000,-

> At the Chemical Industries Exposition Grand Central Palace New York City Plastics & Molded Products has reserved Booth 431 May 6—11

000 letters sent by people who answered classified advertisements—this in addition to the responses the advertisers got by telephone and in personal calls.

Right here it might be interjected that the earnest seeker after the truth as to the real power of advertising might say: "Finally, isn't the value of advertising, or the power of advertising, determined by reader interest?"

Undoubtedly it is. But I am assuming here, of course, that the sophisticated buyer of advertising is not placing his copy in unproved mediums.

On the negative side in further proof of my point about space multiplied by circulation, multiplied by frequency, multiplied by copy, it would be ridiculous to contend that a medium with a circulation of 500,000 is as good as one with 2,000,000. No one but a dilettante would ever possibly advance the contention that space in an inadequate medium can, in some mysterious way, produce adequate results. There are no such magical effects to be had. Therefore, unless the buyer of advertising considers it in a light similar to that in which he

buys coal for heat or any of his other supplies, he is not ready for any considerable purchase.

What the Advertiser Buys

The investor in advertising is buying sales results. He is buying consumer demand-as an actuality and not as some imaginary or elusive thing that never happened. If an advertiser has no evidence of consumer demand or consumer acceptance there is something radically wrong with his product, price, personnel-or his advertising. Therefore, we must look upon advertising in terms of tangibility; and this algebraic statement of mine is volunteered in the hope that it may be helpful to those who have any questions or any doubts, or who may be unable satisfactorily to answer the question the engineer asked at the conference referred to above.

Advertising is power. This is why thirteen pages in a year are not as good as twenty-six. This is why good copy is better than indifferent or poor copy. This is why a medium with high-class editorial content can bring better results than the other kind.

The practical application of this mathematical formula of mine enabled me to proceed with precision and exactness in many an advertising problem where otherwise I would be in doubt. Thinking it all over for the purpose of writing this article for Printers' Ink I am almost amazed at how helpful the formula has been to us. I am venturing to bring it forward here, therefore, not because I think I have made any worldsaving discovery, but in the hope that it may be as useful to others as it has been to me.

There is another factor in advertising—a by-product, to be exact—that might well be mentioned in this final paragraph. This is, that after all the values of advertising have been charged off and the cost of sales has been charged off, there remains a residue of good-will that may outweigh all its other values.



Made of Fireproof Refractory Cetec

LET us send you a sample of our No. 101 High Heat, Fireproof, Refractory material—grey-white in color.

Shown above is a safety switch deflector molded from this new asbestos base substance. It will stand heat up to 2200 degrees Fahrenheit, without injury or decomposition. It is easily moulded to form, with metal inserts where necessary, without machining, drilling or fitting.

Send us samples, blueprints or models of any parts. It is more than likely we can save you money.



COL	NECTICUT
MOLDEI	D PRODUCTS CORPORATION MERIDEN, CONN.
Give us full i following par	information about CETEC and its use in the
Name	
NameAddress	



Materials

for the Plastic Industries



LARGEST MANUFACTURERS OF

WOOD FLOUR

Inquiries solicited

BECKER MOORE & CO.

NO. TONAWANDA, N. Y.

Cellu-Gummed Labels

That stick to Pyroxylin Plastics.

Also Regular Gummed and Ungummed Labels, printed, plain, embossed, die cut, Cardboard Tags, printed and blank.

Economy Ticket & Label Co.

552 7th Ave., New York City

Why Not Cotton Flock?

For Use in All Classes of Plastic Composition

As a binder in composition products cotton with its longer fiber is the best procurable. Why not try it?

THE PECKHAM MFG. CO.

240 South St.

Newark, N. J.

GUMS

For Moulded Composition

RESIN GUM COPAL

FRANCE, CAMPBELL & DARLING IMPORTERS

133-37 FRONT ST. NEW YORK

CELLULOSE ACETATE

CASEIN

FOR ALL PURPOSES

American-British Chemical Supplies, Inc. 16 East 34 St. New York City A Special

Shellac

For each requirement

-

Henry W. Peabody & Co. 17 State St. New York, N. Y. **Manicure Steels**

for mounting in handles

Nail Files Cuticle Knives

Shoe Hooks, Pushers, etc.

Made by

C. J. BATES & SON CHESTER, CONN.

CASEIN

DRIED BLOOD

ARE YOU INTERESTED IN ENTERING THE

PLASTICS FIELD

IF SO, CONSULT ME FOR INSTALLATION, FORMULAE AND METHODS

ADDRESS H. P., CARE PLASTICS

ARTIFICIAL HORN

SYNTHETIC RESINS

Phenol U. S. P.
Formaldehyde
Denatured Alcohol
Methanol
Whiting

WM.S.GRAY & CO.
342 Madison Ave.
New York City



Materials

for the Plastics Industries



RENNET CASEIN

BLOOD ALBUMEN
Finely Powdered

Special Grades for Making Plastics

JUNGMANN & CO.

Incorporated

5 Desbrosses St., New York

CONSULTING CHEMIST

WILL SOLVE PLASTICS PROBLEMS. FINE KNOWLEDGE OF MANU-FACTURING AND FORMULAE

WRITE BOX 11, PLASTICS 114 E. 32 ST., N. Y. C. Established 1889

The Burnet Company

292 Pearl Street, New York

Telephone Beekman 2287

Wood Flour Phenol U. S. P. Formaldehyde

and other raw materials used in the manufacture of high grade molding compounds.

Inquiries Solicited

We are fully equipped to design, print and mail your house organs or direct advertising.

Price and quality need not be inconsistent, and we can overcome your problems. Plastics, Box 101.

Index Directory & Buyers Guide Will Shortly Be Ready For Distribution

Orders May Be Placed in Advance at Five Dollars Per Copy, Sent To Plastics Directory, 114 East 32nd St., New York City



Buyers' Guide.

ACCUMULATORS

The Burroughs Co. John J. Cavagnaro, Harrison, The Dunning & Boschert Press Co., Inc. Chas. F. Elmes Engineering Works R. D. Wood A. B. Farquhar

ALADDINITE

Aladdinite Co.

BAKELITE

Bakelite Corporation

Jungmann & Co.

CAMPHOR (Synthetic)

C. B. Peters Co.

CASEIN

Jungmann & Co. T. M. Duche American-British Chemical Supplies, Inc.

CASEIN PLASTICS

Aladdinite Co. Karolith Corp. Erinoid Co. of America

CELORON

Celoron Co.

CELLULOID

Celluloid Corp.

CELLULOSE ACETATE

E. W. Wiggins American-British Chemical Supplies, Inc.

COLASTA

Colasta Co., Inc.

COTTON FLOCK

Peckham Mfg. Co.

CUSTOM MOULDERS

Connecticut Molded Corp., Meriden, Conn. General Elec. Co. Products Insulation Mfg. Co., Brooklyn, Kuhn & Jacob, Trenton, N. J. Kurz-Kasch Co., Dayton, Ohio Northern Indus. Chem. Co., Boston, Mass. Norton Laboratories, Lockport, N. Y.

Recto Mfg. Co., Cincinnati, Ohio Scranton Button Co., Scranton, Pa. Shaw Insulator Co. Jos. Stokes Rubber Co.

Standard Tool Co.

DUREZ

General Plastics Inc.

Erinoid Co. of America

FIBERLOID

Fiberloid Corp.

GLASS, SILVERED

Standard Mirror Co. Tassi Bros.

GL MS

France, Campbell & Darling Wm. H. Scheel

HEAT REGISTERING

INSTRUMENTS

Cambridge Instrument Co.

HERCULITE

The Colasta Co.

HYDRAULIC EQUIPMENT

Fred S. Carver, New York City John J. Cavagnaro, Harrison, N. J. Evarts G. Loomis Co. Terkelsen Machine Co. Burroughs Co., The Chas. F. Elmes Engineering Wonks Southwark Foundry & Mach. Co. Dunning & Boschert Press Co. French Oil Mill Machinery Co. A. B. Farquhar R. D. Wood Corp.

KAROLITH

Karolith Corp.

LABELS

Economy Ticket & Label Co.

MANICURE ARTICLES

C. J. Bates & Sons, Chester,

MEASURING MACHINES

F. J. Stokes Mach. Co.

MIRRORS

Standard Mirror Co. Tassi Bros.

MOLDING POWDERS

Bakelite Corp. Celoron Co. Colasta Co., Inc. General Plastics, Inc.

Ukline Pearl Essence Co. E. W. Wiggins & Co., Inc.

PHENOL RESINOIDS

Bakelite Corporation General Plastics Inc. Celoron Co.

PREFORMING PRESSES Arthur Colton Co. F. J. Stokes Mach. Co.

PYROXYLIN PLASTICS

Fiberloid Corp. Celluloid Corp. Jos. H. Meyer Bros. Du Pont Viscoloid Co. E. W. Wiggins

ROLLING MACHINERY

Evarts G. Loomis Co.

SHELLAC

Wm. H. Scheel Henry W. Peabody Co.

SWING JOINTS

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TICKETS

Economy Ticket & Label Co.

Standard Tool Co.

TUMBLING

Rudolph R. Siebert

VARNISHES

Celoron Co.

VISCOLOID

Du Pont Viscoloid Co.

WOOD FLOUR

Acme Oil Co. Becker Moore Co. Burnett Co. Jungmann & Co.



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An unusual record of expansion among the executives and technical men in the plastic field: worthy of the attention of every advertiser





Cans of preforms located at convenient height above work bench. Blowing out mold with air hose

Use every precaution to keep molding material free from foreign matter

AT all times preforms should be kept in air-tight covered cans, so that they cannot become contaminated with dirt or grease, or absorb moisture from leaks in steam lines or rain from open windows. Tablets should always be kept above the level of the work-bench to prevent dirt or scrap from the day's work falling into containers.

Always remove old flash from previous run, to avoid building up on the flash ridge, thus preventing the proper closing of the mold. There also is danger of this old flash being driven into the thin hardened skin of the mold, causing "pitting" or small indentations in the mold surface.

Small particles of brass turnings are frequently found among metal inserts, and fall into the mold during the process of assembling these inserts on the pins. Use the air hose to blow out the mold before the charge is placed in it. Do not use the air hose to clean the

bench; metal particles blown from the bench may contaminate molding material nearby.

This advertisement is the seventh of a series in which we are featuring a few fundamental rules of plastic molding. Although obvious to many, we find they are frequently overlooked resulting in a loss of time and money to the molder. By calling attention to some of these simple rudiments the Bakelite Corporation hopes to give its customers the benefit of its long experience in its endeavor to advance the art of plastic molding. Enlargements of these advertisements have been made so that they can be placed on the bulletin board in your Molding Rooms. Copies may be had upon request.

BAKELITE CORPORATION

247 Park Ave., New York, N. Y. Chicago Office, 635 W. 22nd St. BAKELITE CORPORATION OF CANADA, Ltd., 163 Dufferin St., Toronto, Ontario

BAKELITE

THE MATERIAL OF ON A THOUSAND USES

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